

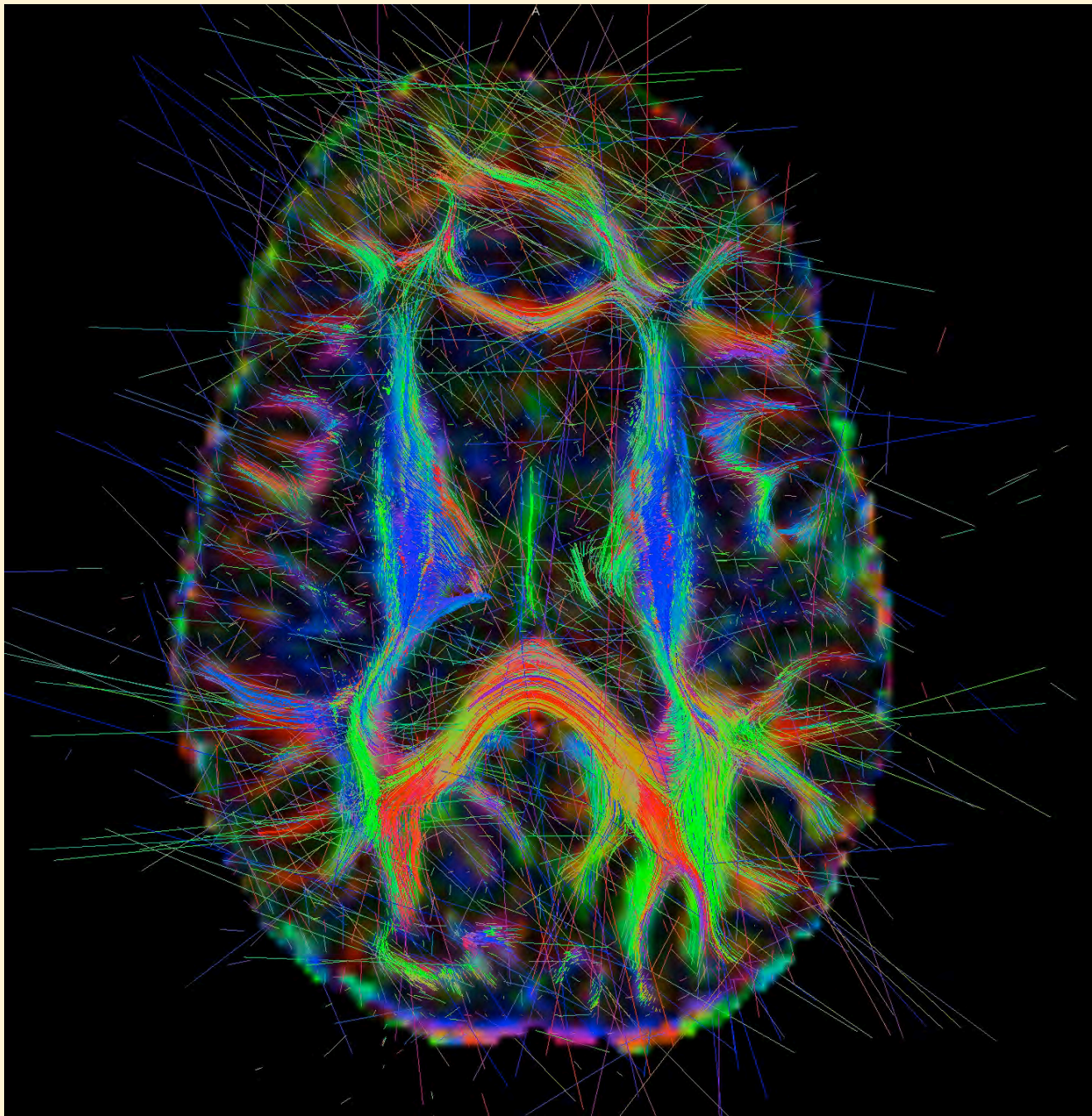
THE PHYSIOLOGY OF ADDICTION

Effects of Drug-Taking Behavior on the Brain

Ruth A. Potee, MD

Family Physician & Addictionologist, Valley Medical Group
Medical Director, Franklin County House of Corrections
Medical Director, Franklin Recovery Center
Medical Director, Pioneer Valley Regional School District
Co-Chair – Healthcare Solutions of the Opioid Taskforce

*Thanks to Tess Jurgensen and the OTF of Franklin County
and North Quabbin for organizing these forums*



HIJACKING THE BRAIN

New research suggests that the brain's reward system has different mechanisms for craving and pleasure. Craving is driven by the neurotransmitter dopamine. Pleasure is stimulated by other neurotransmitters in "hedonic hot spots." When the craving circuitry overwhelms the pleasure hot spots, addiction occurs, leading people to pursue a behavior or drug despite the consequences.

PATHWAYS TO CRAVING

Desire is triggered when dopamine, which originates near the top of the brain stem, travels through neural pathways to act on the brain. Drugs increase the flow of dopamine.

Ventral tegmental area (VTA)

Dopamine is produced here and flows outward along neurons distributed throughout the brain's reward system.

Dorsal striatum

Neurons here help form habits by identifying enjoyable patterns, such as the anticipation of buying drugs.

Prefrontal cortex

The amino acid glutamate, produced here, interacts with dopamine to spark visualizations that cue cravings.

Amygdala

Neurons here are stimulated by learned emotional responses, such as memories of cravings and pleasure.

Orbitofrontal cortex

This hot spot gives a sense of gratification but is also the first to shut down if a person has indulged too much.

Ventral pallidum

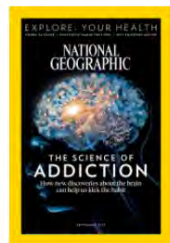
Animal experiments show that damaging this hot spot can turn something that once gave pleasure into a source of disgust.

Nucleus accumbens

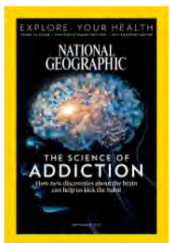
A hot spot within this key part of the craving circuitry amplifies the response to pleasure.

PLEASURE HOT SPOTS

A system of small hedonic hot spots, unrelated to dopamine, provides temporary sensations of pleasure and forms a feedback loop with the reward system that controls desire.



September 2017



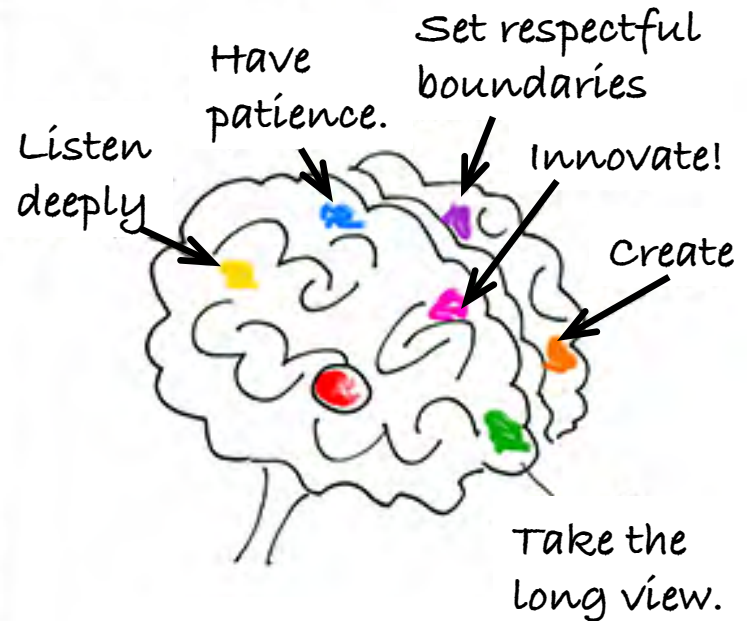
September 2017

EAT, DRINK, HAVE SEX (AND USE DRUGS)



Run!
Fight!
Get Laid!

Lizard brain advice

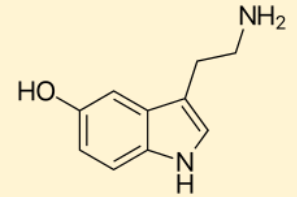
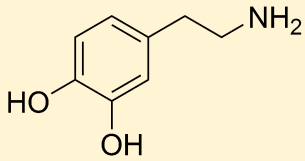


Listen deeply
Have patience.
Set respectful boundaries
Innovate!
Create
Take the long view.

Cortex advice

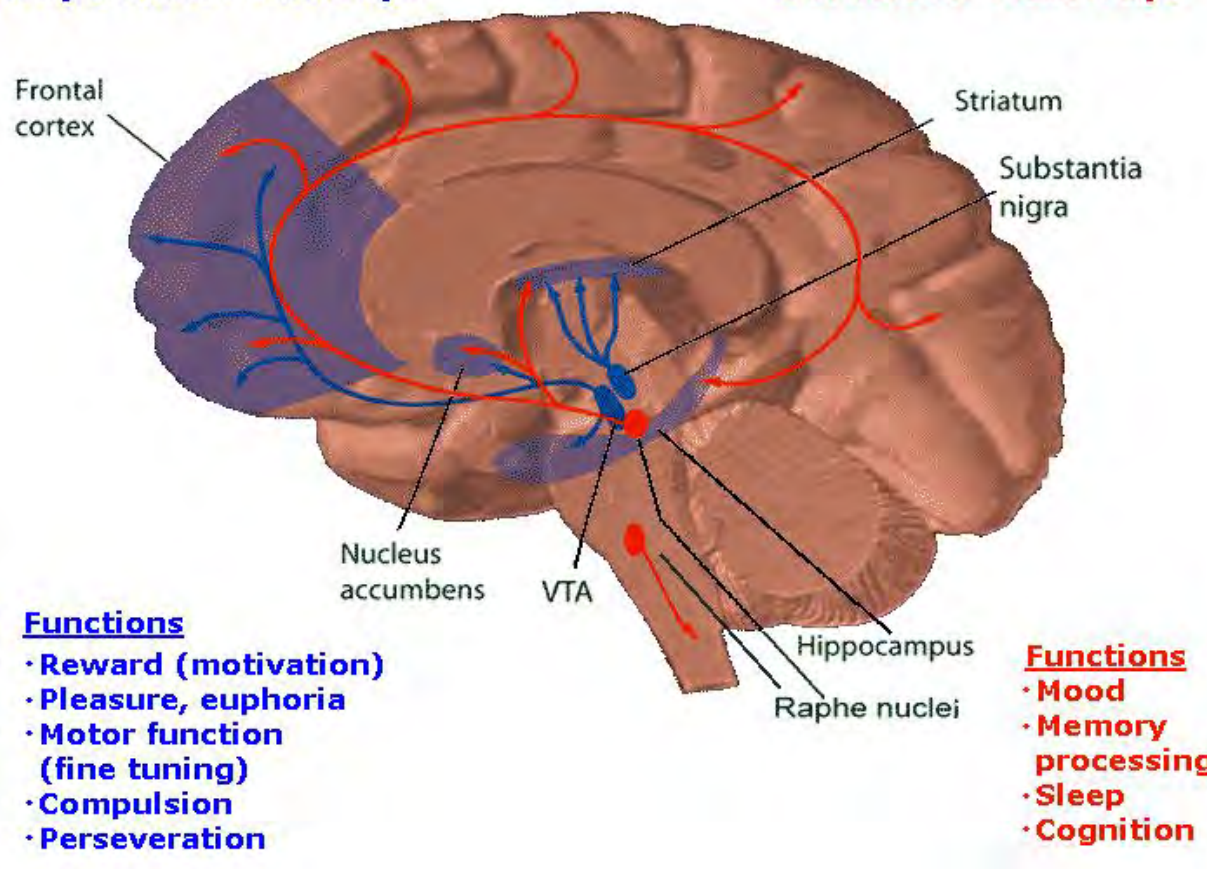
DOPAMINE & SEROTONIN

Location and Function



Dopamine Pathways

Serotonin Pathways

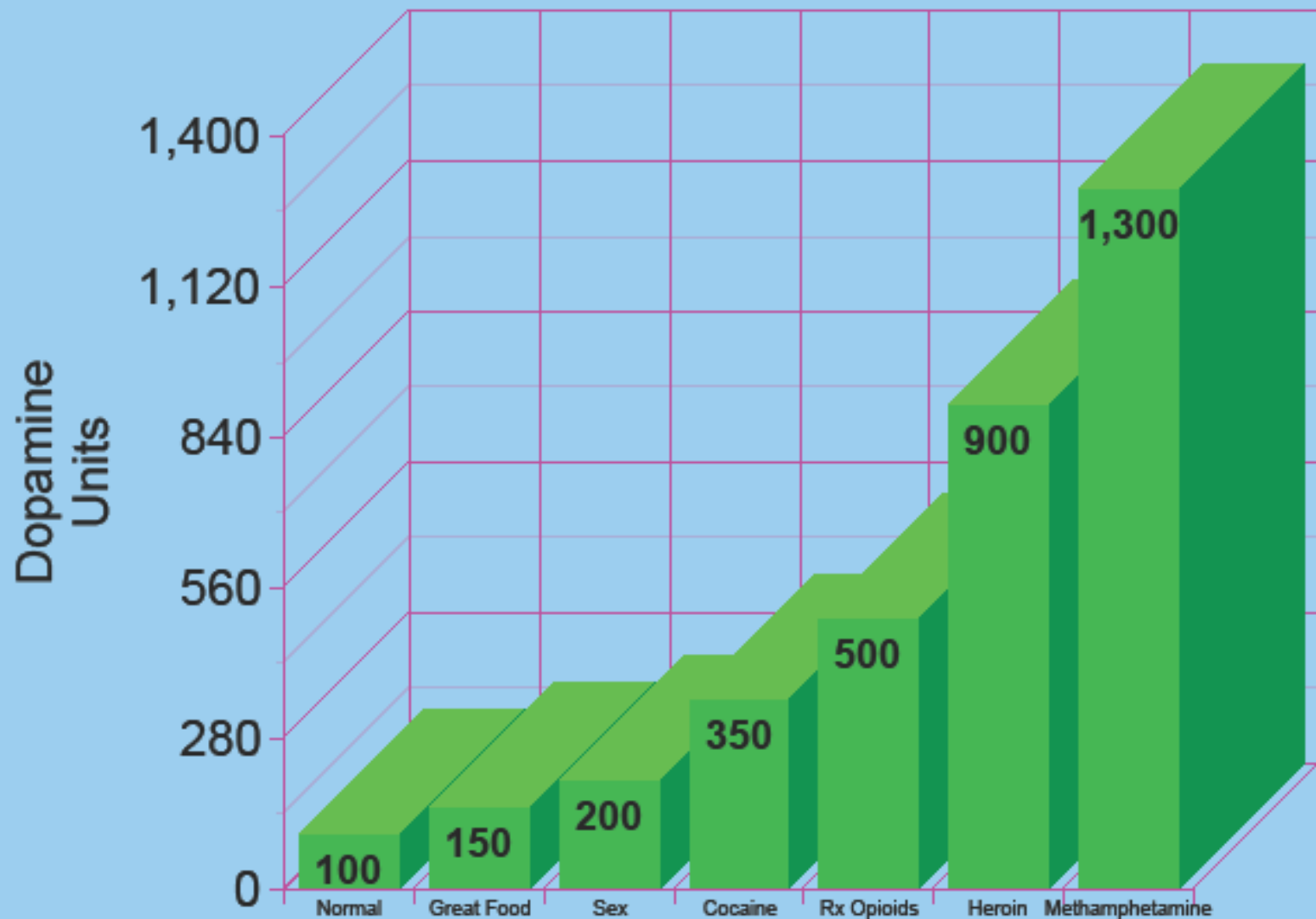




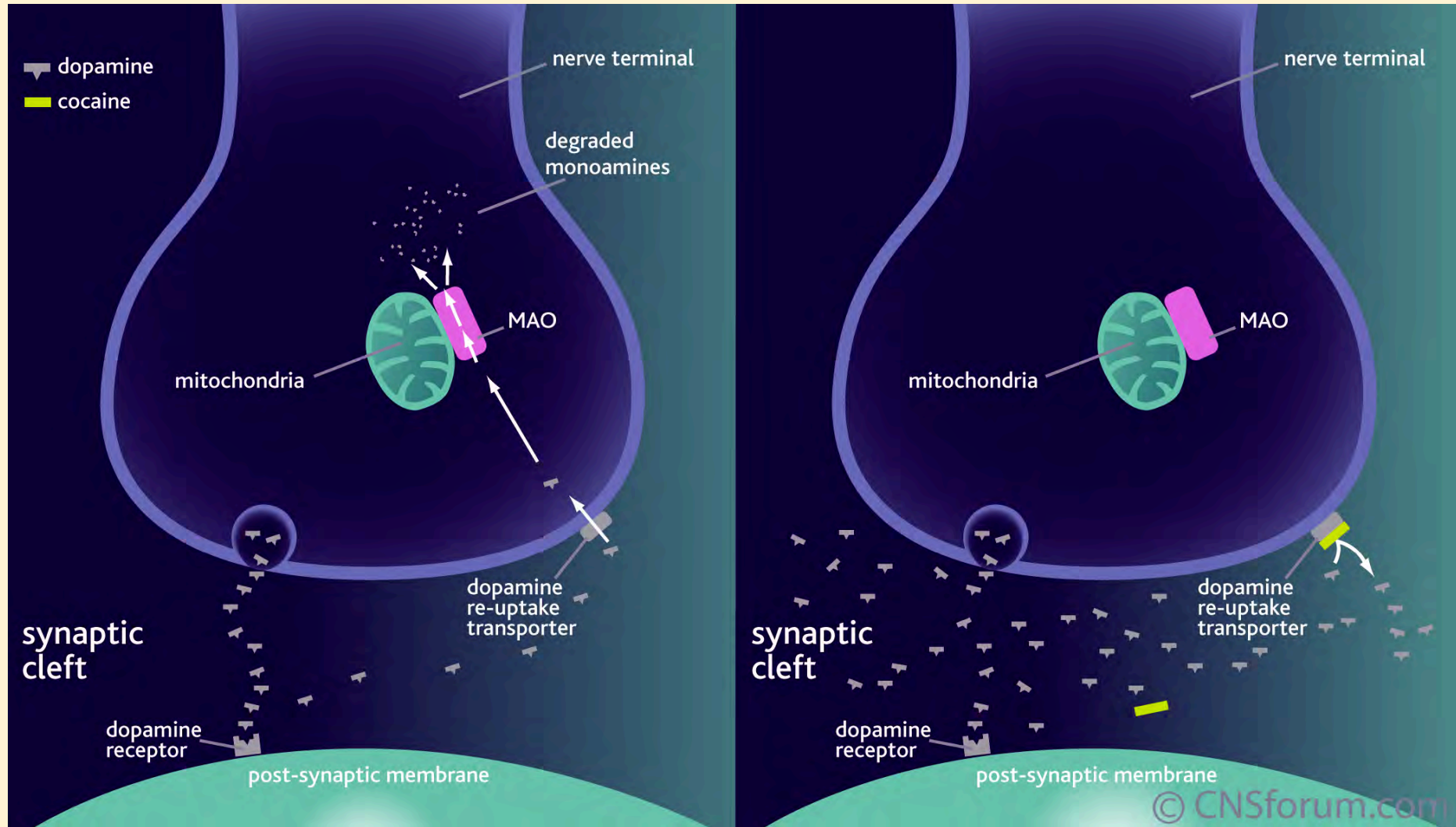
IT IS SAD
TODAY.



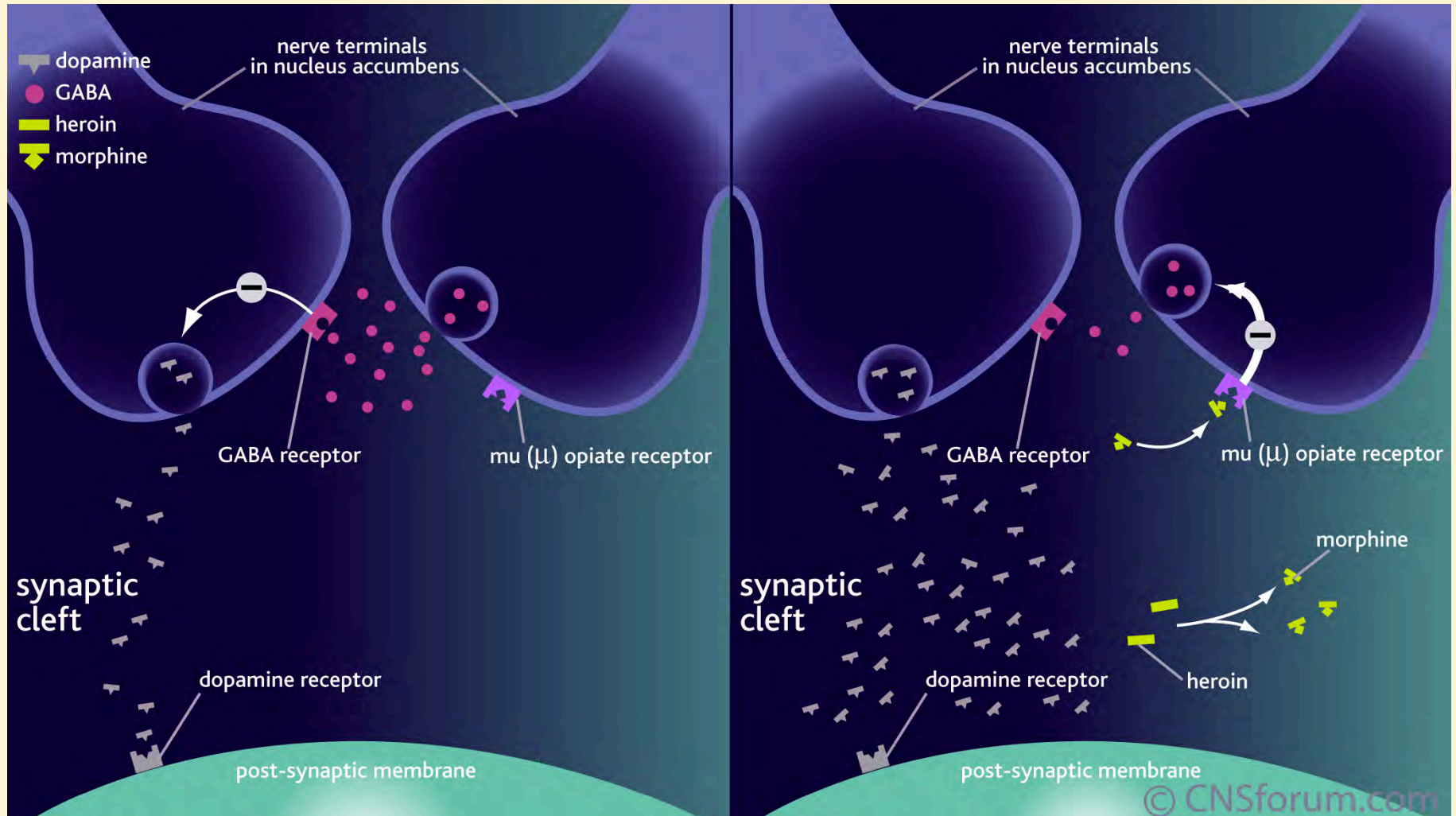
Dopamine Levels

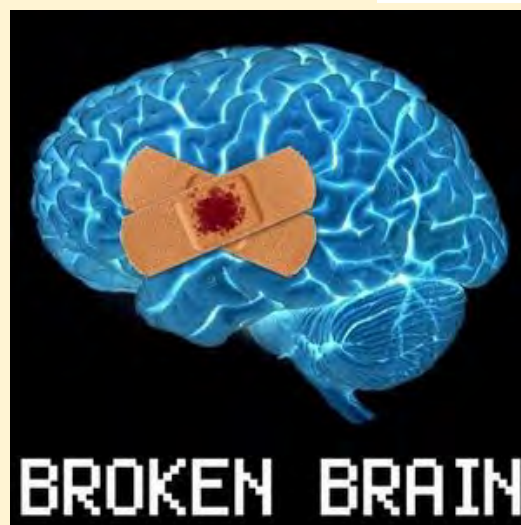
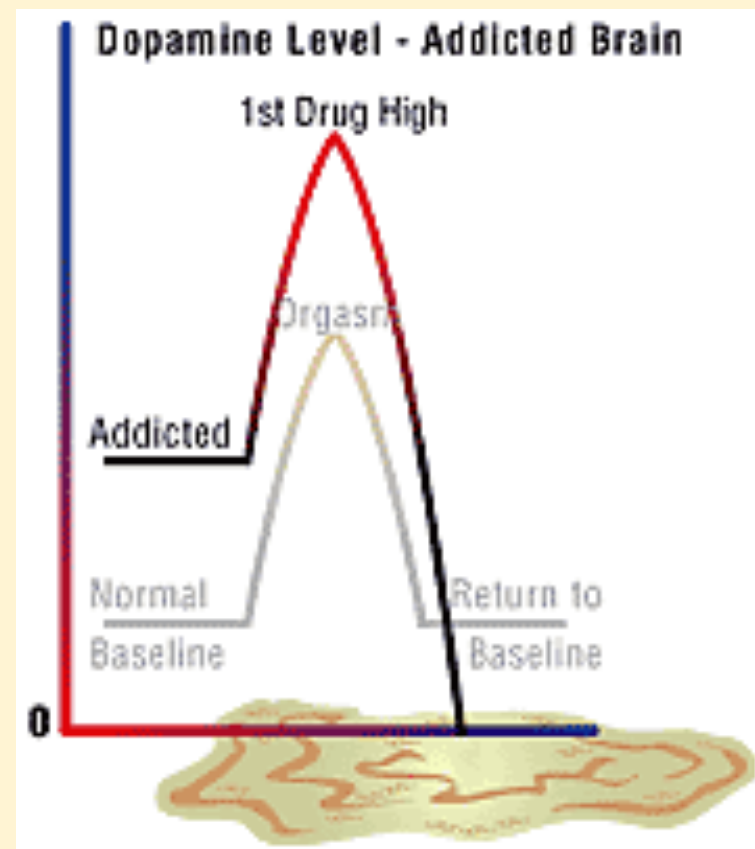
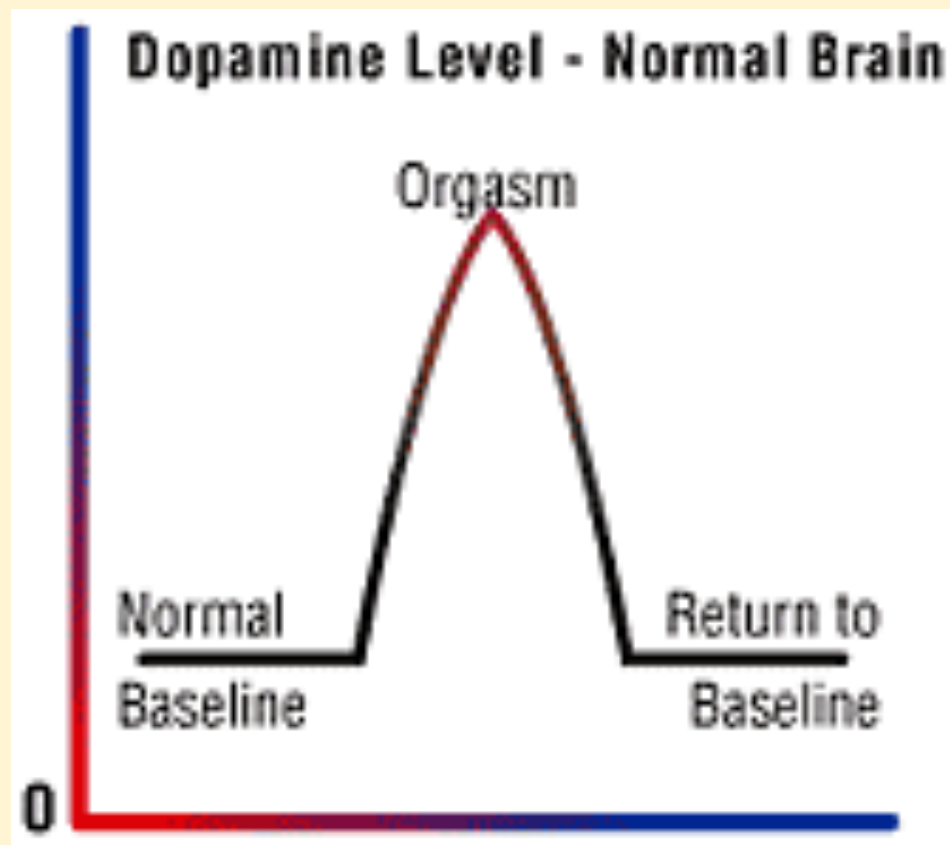


How Cocaine Works



How Heroin Works

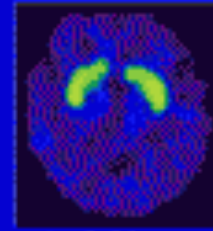
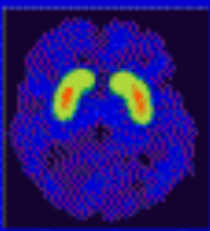
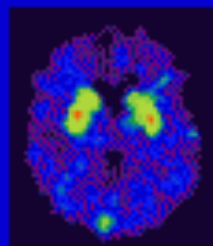
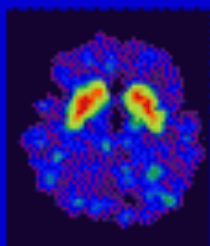
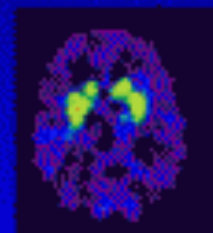
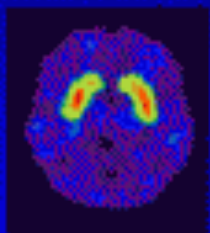
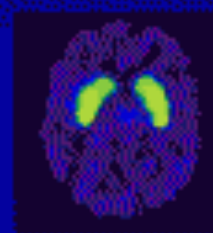
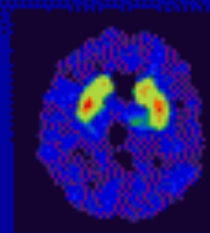






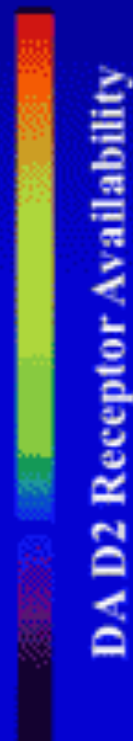
Functionally...

Dopamine D2 Receptors are Decreased by Addiction



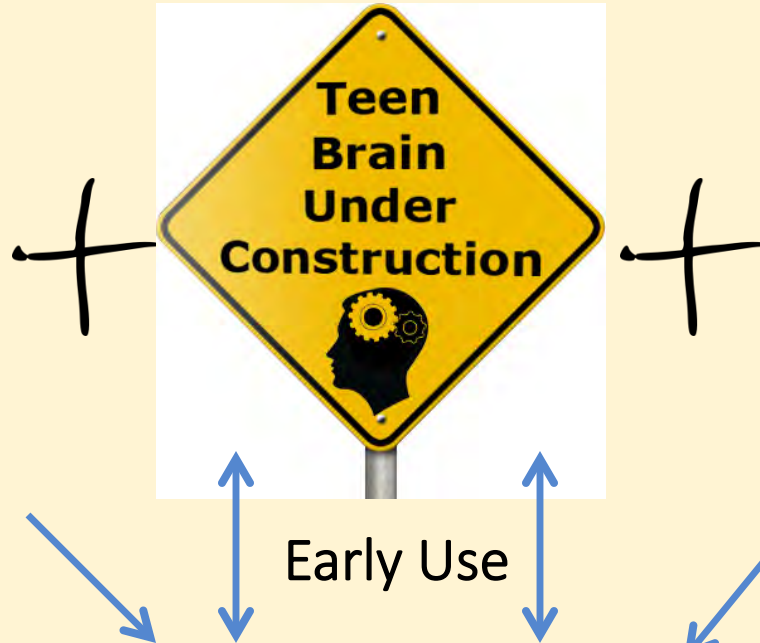
Control

Addicted





Genetics



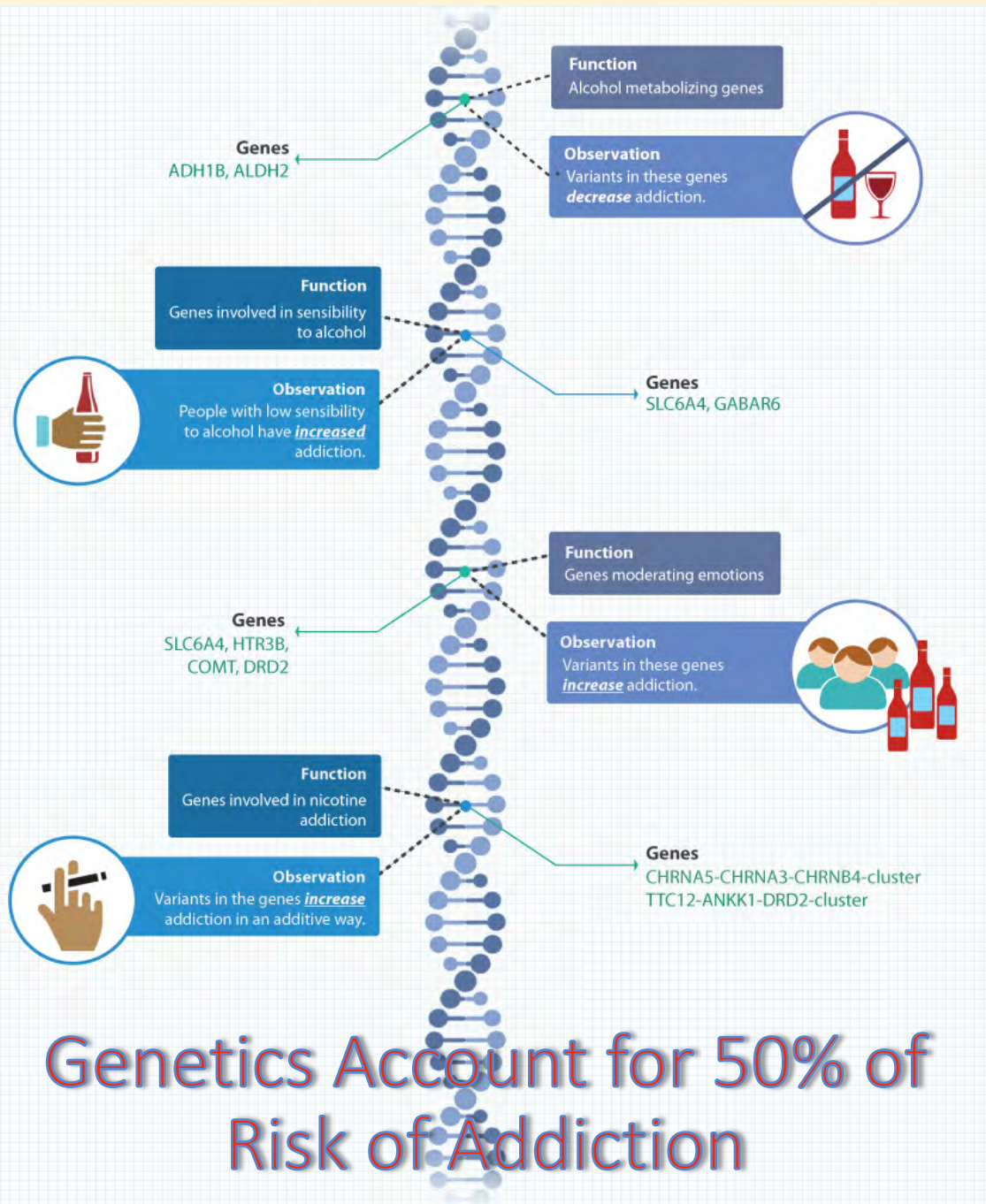
Early Use



Trauma

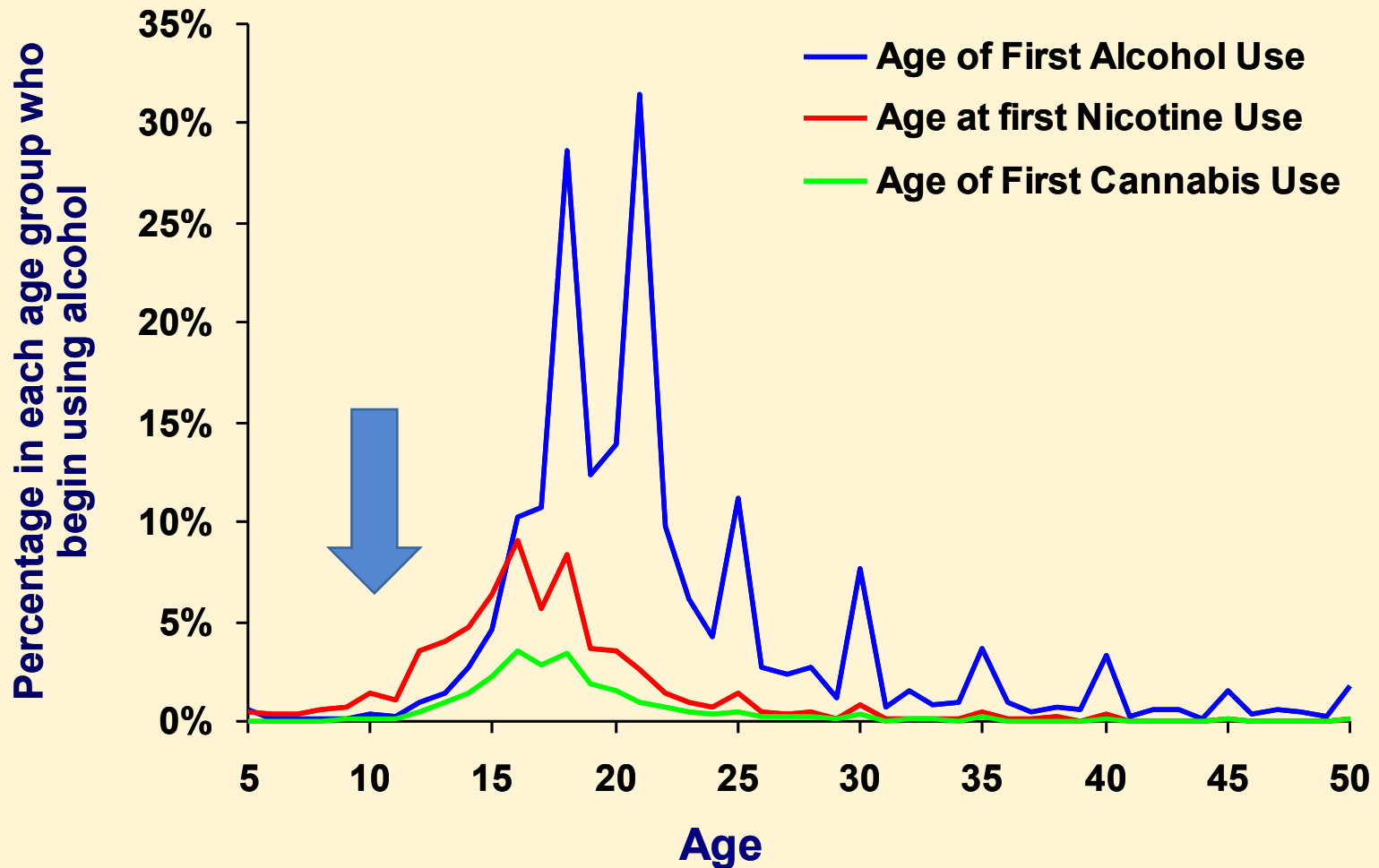


Poor Mental Health



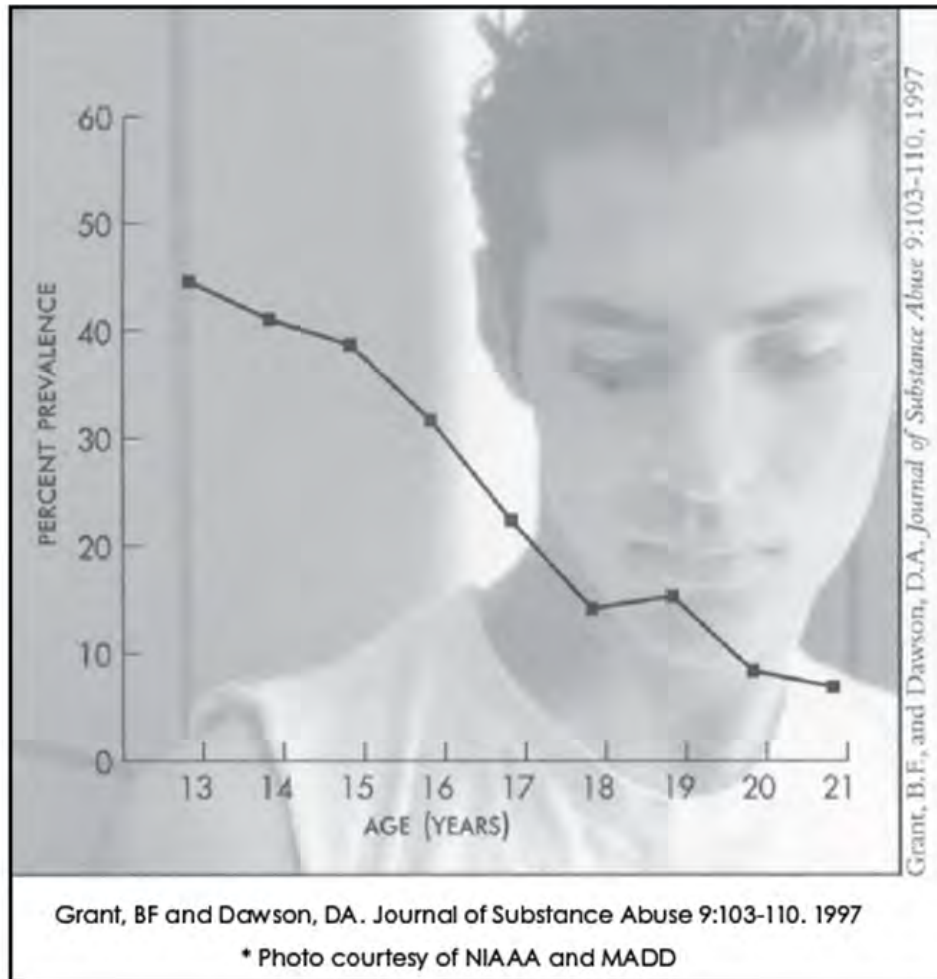


Addiction is a Developmental Pediatric Disease



Source: NIAAA National Epidemiologic Survey on Alcohol and Related Conditions, 2003

Teen Alcohol Use Wires The Brain For Addiction

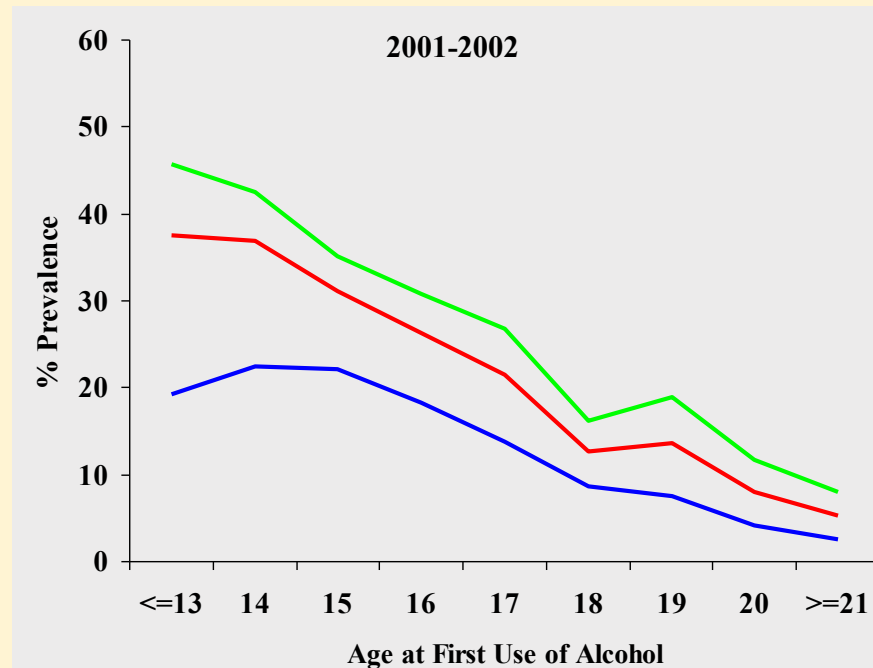


40% of kids who begin drinking at age 15 will become alcoholics.

Only 7% of those who begin drinking at age 21 become alcoholics.



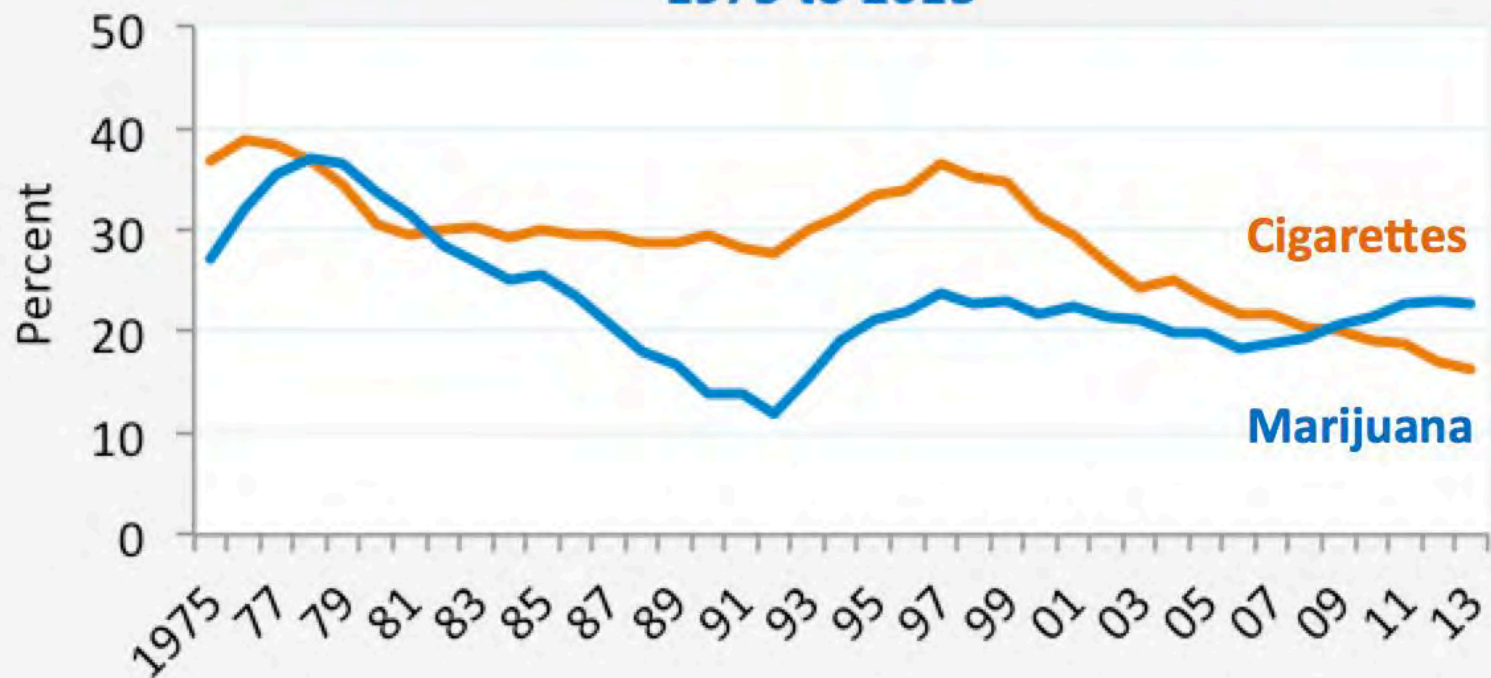
Prevalence of Lifetime Alcohol Dependence by Age of First Alcohol Use and Family History of Alcoholism



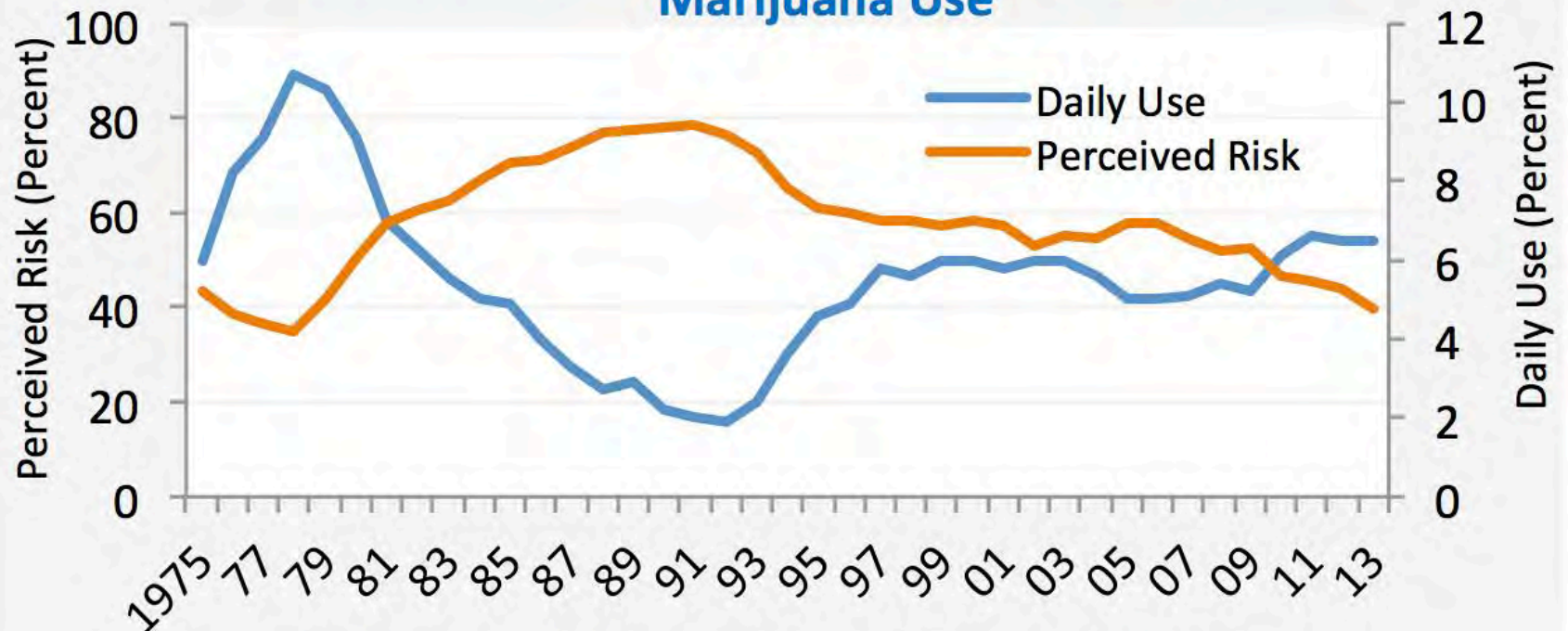
Source: 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions; Laboratory of Epidemiology and Biometry; DICBR, NIAAA, Bethesda, MD.

- Parental History Positive
- Total
- Parental History Negative

Percentage of U.S. 12th Grade Students Reporting Past Month Use of Cigarettes and Marijuana, 1975 to 2013



Percentage of U.S. 12 Grade Students Reporting Daily Marijuana Use vs. Perceived Risk of Regular Marijuana Use



Source: The Monitoring the Future study, the University of Michigan



“Not Addictive”

“It’s Natural”

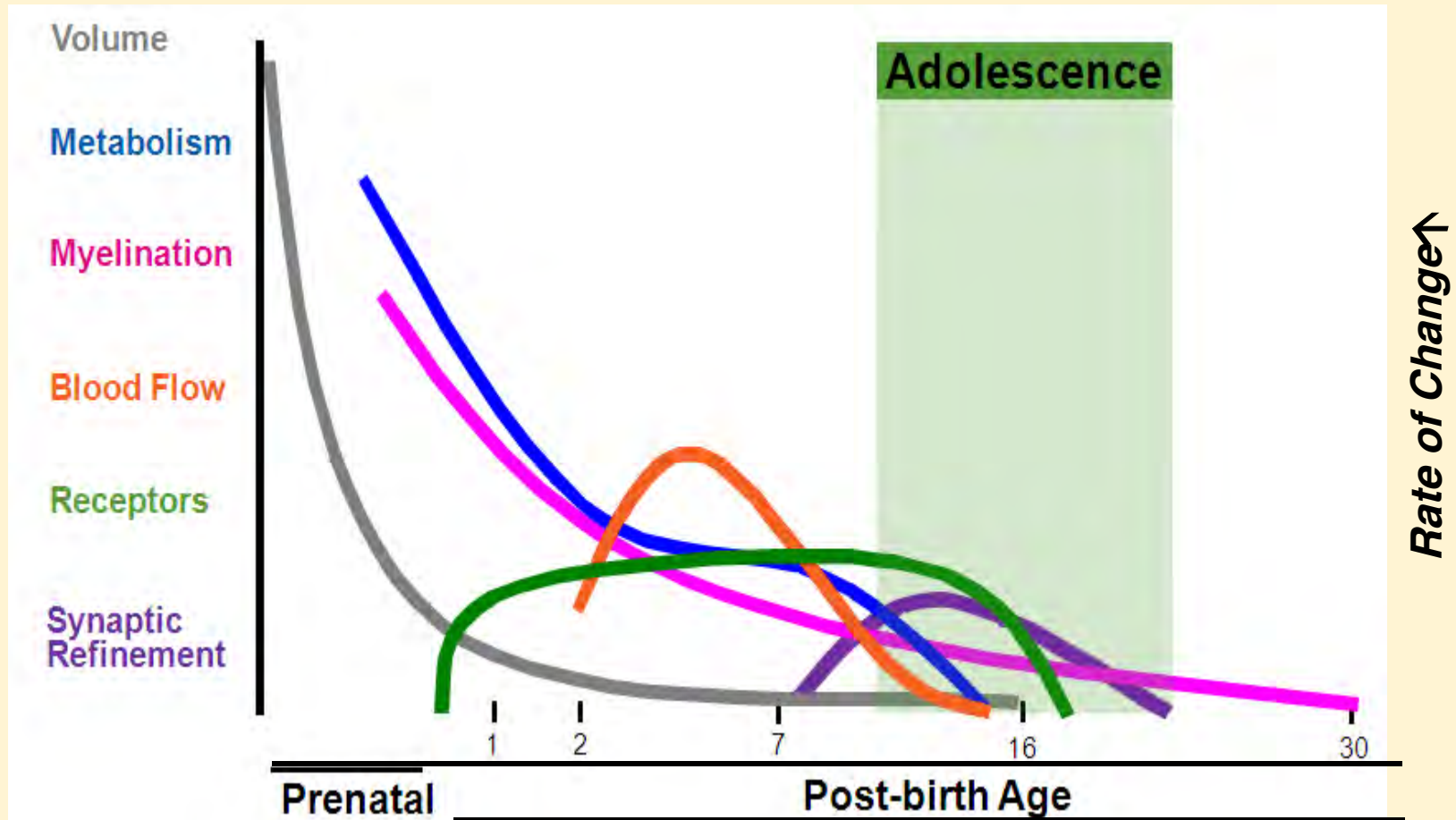
“It’s Medicine”

“Better than
Alcohol”

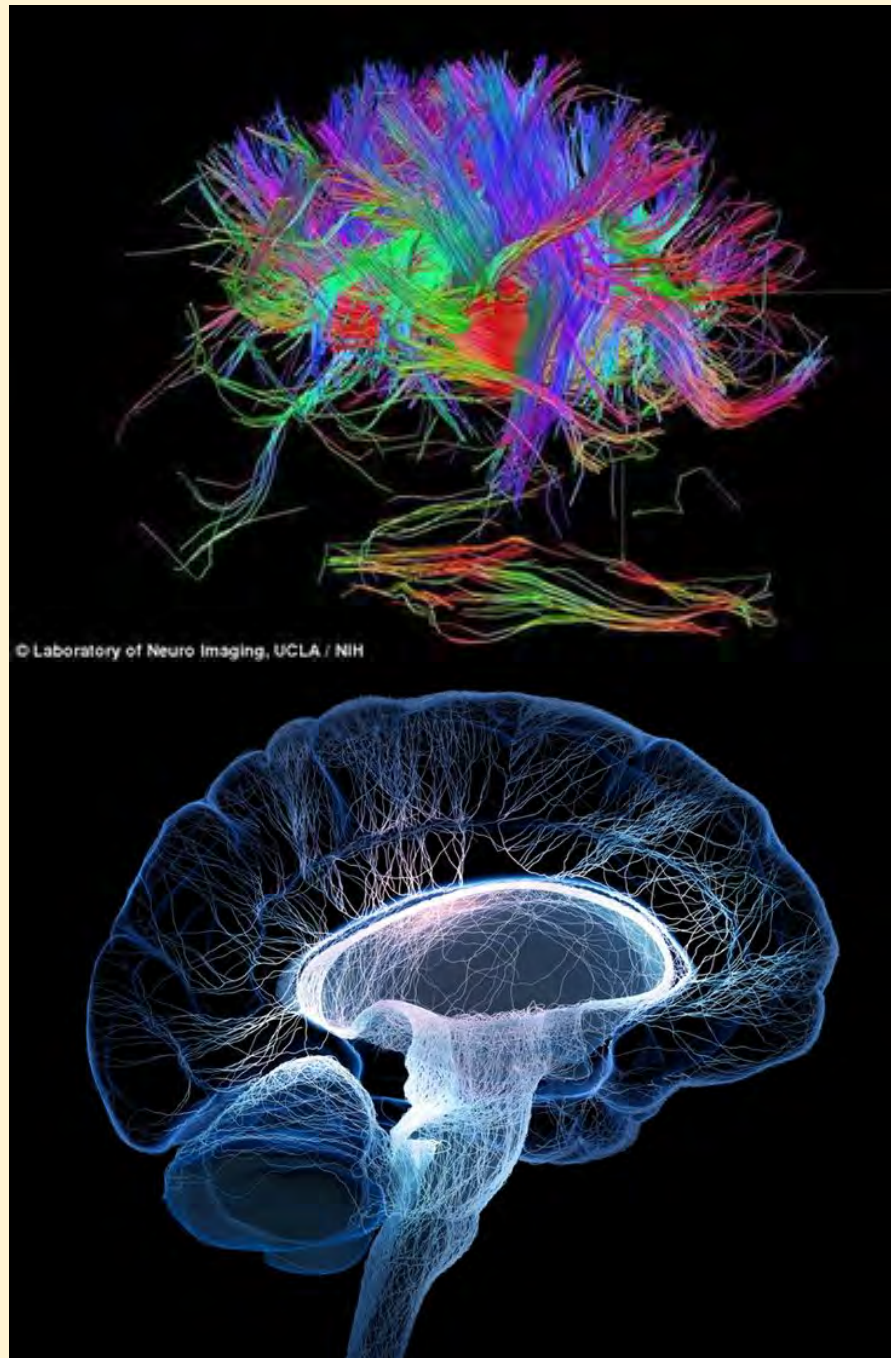
“It is Legal”

“Never Killed
Anyone”

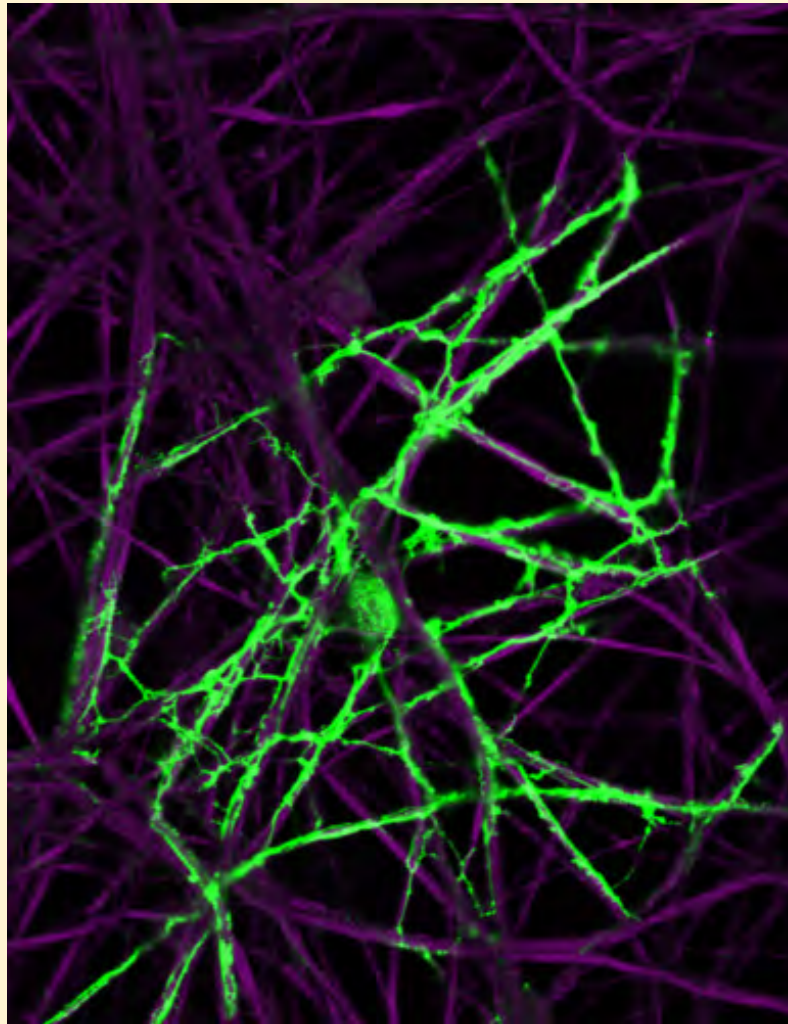
Brain Development



Source: Tapert & Schweinsburg, 2005



Synaptic Refinement



Myelination

Hypersensitive
to Social
Exclusion

This is Normal Development

Preference for
Physical
Activity and
Sensation
Seeking

More Risky
Impulsive
Behavior



Emotions Felt
Very
Intensely

Less than
Optimal
Planning

Less
Consideration
of Negative
Consequences

Strongly
Influenced by
Friends and
Peers

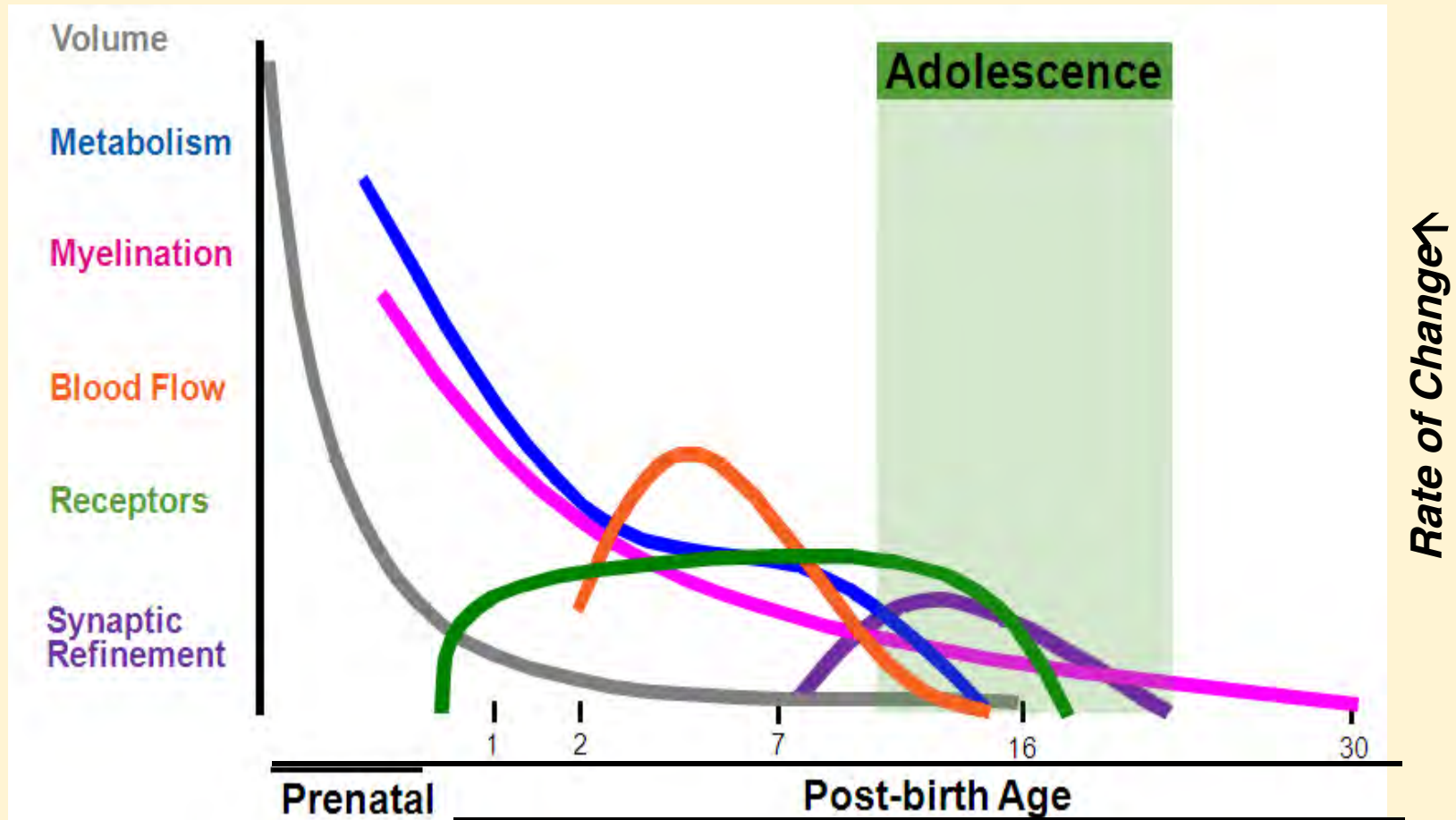
**"I'M NOT
WHO YOU THINK I AM;
I'M NOT
WHO I THINK I AM.
I AM
WHO I THINK
YOU THINK I AM."**

~ THOMAS COOLEY

The Looking Glass Self

Adolescents are more likely to compare themselves to others, feel that they are being compared or judged and place higher value on that judgement

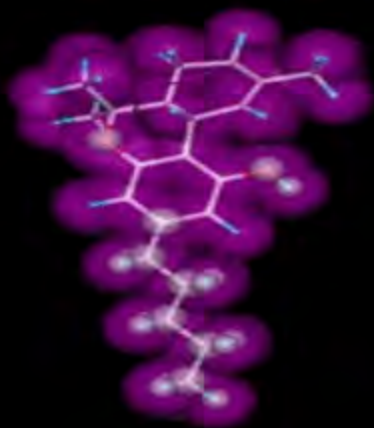
Brain Development



Source: Tapert & Schweinsburg, 2005

Marijuana
(Tetrahydrocannabinol)

Drug



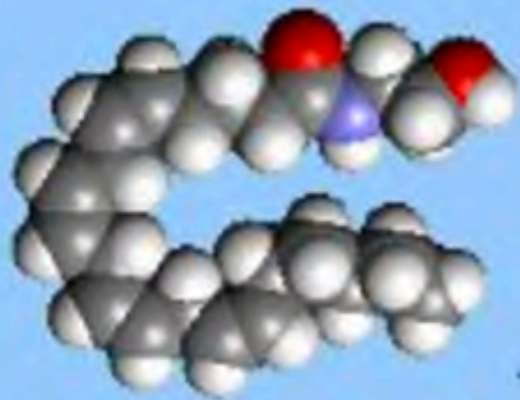
THC

Endo-cannabinoid
(Anandamide)

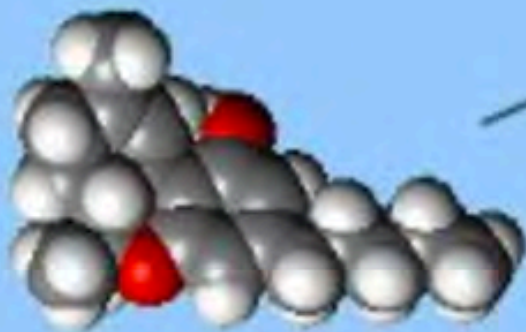
Brain's Chemical



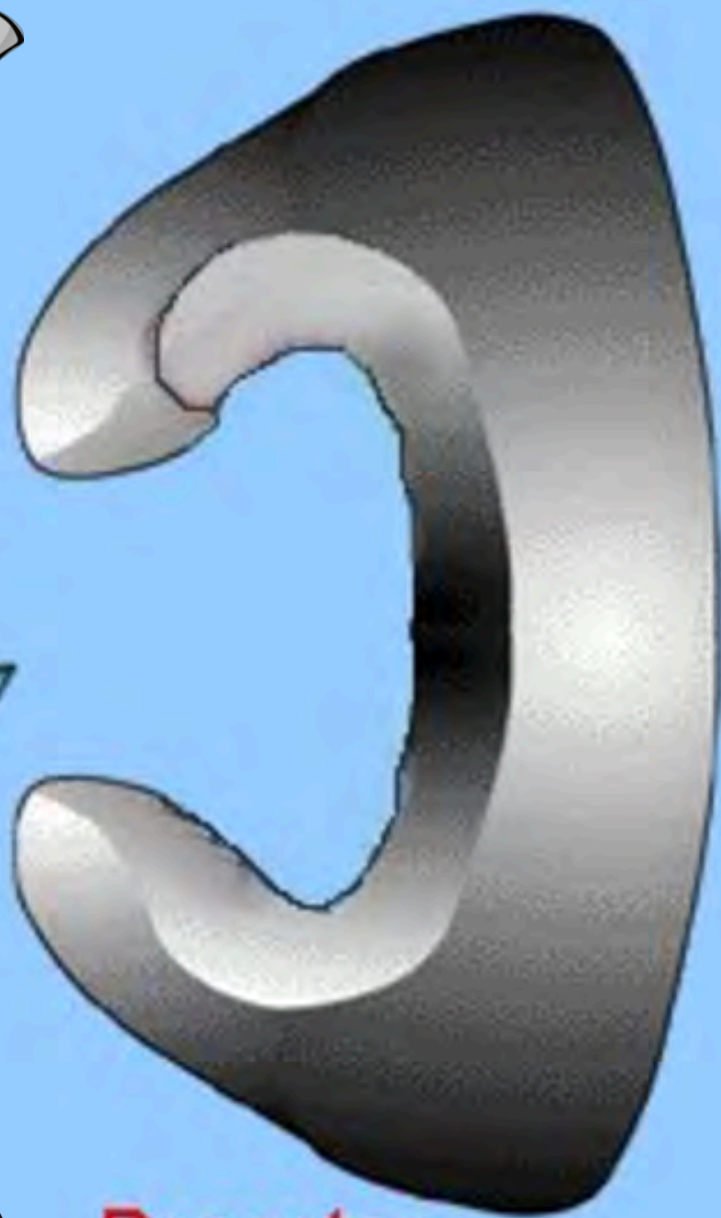
Anandamide



anandamide



THC



Receptor

Persistent cannabis users show neuropsychological decline from childhood to midlife

Madeline H. Meier^{a,b,1}, Avshalom Caspi^{a,b,c,d,e}, Antony Ambler^{e,f}, HonaLee Harrington^{b,c,d},
Renate Houts^{b,c,d}, Richard S. E. Keefe^d, Kay McDonald^f, Aimee Ward^f, Richie Poulton^f, and
Terrie E. Moffitt^{a,b,c,d,e}

Author Affiliations 

Edited by Michael I. Posner, University of Oregon, Eugene, OR, and approved July 30, 2012 (received for review April 23, 2012)

Abstract

Full Text

Authors & Info

Figures

SI

Metrics

Related Content

PDF

PDF + SI

Abstract



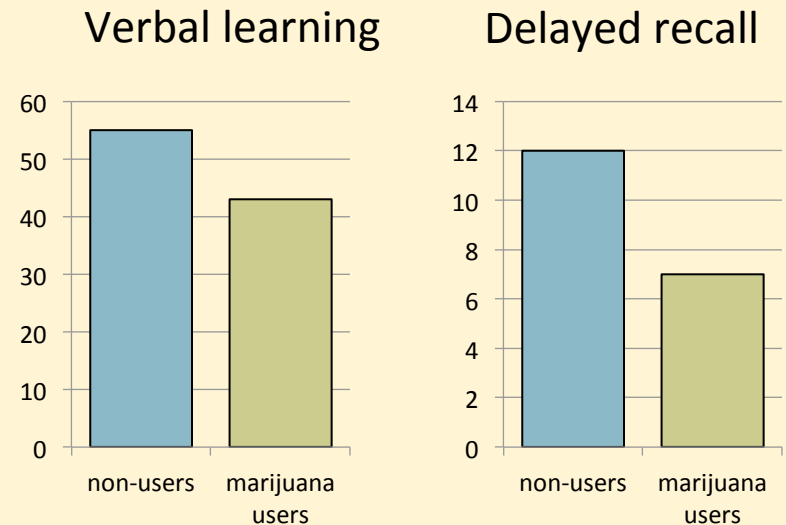
Recent reports show that fewer adolescents believe that regular cannabis use is harmful to health. Concomitantly, adolescents are initiating cannabis use at younger ages, and more adolescents are using cannabis on a daily basis. The purpose of the present study was to test the association between persistent cannabis use and neuropsychological decline and determine whether decline is concentrated among adolescent-onset cannabis users. Participants were members of the Dunedin Study, a prospective study of a birth cohort of 1,037 individuals followed from birth (1972/1973) to age 38 y. Cannabis use was ascertained in interviews at ages 18, 21, 26, 32, and 38 y. Neuropsychological testing was conducted at age 13 y, before initiation of cannabis use, and again at age 38 y, after a pattern of persistent cannabis use had developed. Persistent cannabis use was associated with neuropsychological decline broadly across domains of functioning, even after controlling for years of education. Informants also reported noticing more cognitive problems for persistent cannabis users. Impairment was concentrated among adolescent-onset cannabis users, with more persistent use associated with greater decline. Further, cessation of cannabis use did not fully restore neuropsychological functioning among adolescent-onset cannabis users. Findings are suggestive of a neurotoxic effect of cannabis on the adolescent brain and highlight the importance of prevention and policy efforts targeting adolescents.

Deficits in Cognitive Functioning Among Active Marijuana Users

Many studies show that adolescents who use marijuana heavily tend to score worse than non-users on tests of:

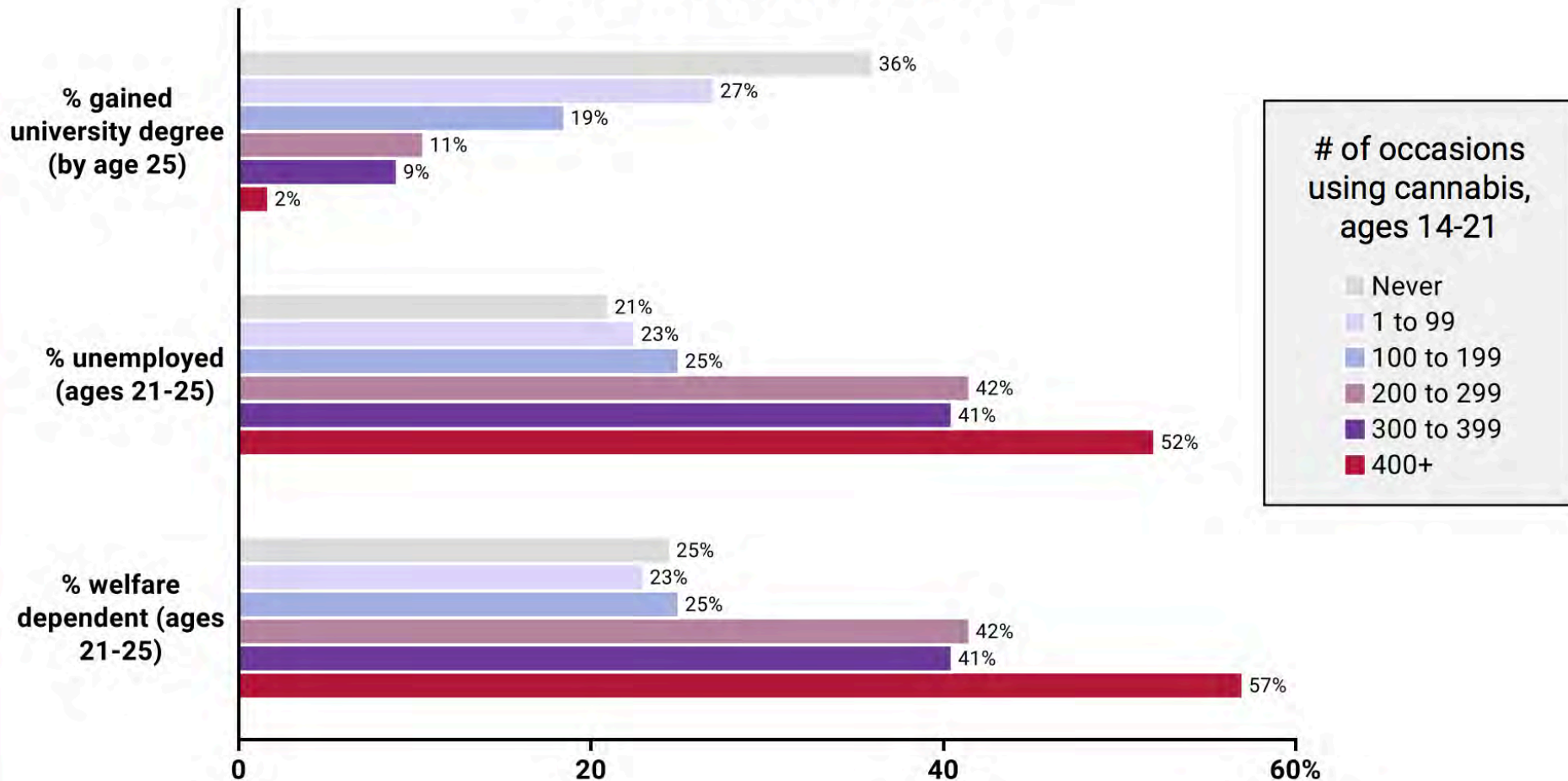
- attention
- verbal learning
- memory
- processing speed

... even when
they are not high.



Messinis, et al 2006

New Zealand study showing relationship between cannabis use and social outcomes



Source: Fergusson and Boden. *Addiction*, 103, pp. 969-976, 2008 [New Zealand study]

Loss of Adult IQ with Marijuana Dependence in Adolescence

Findings:

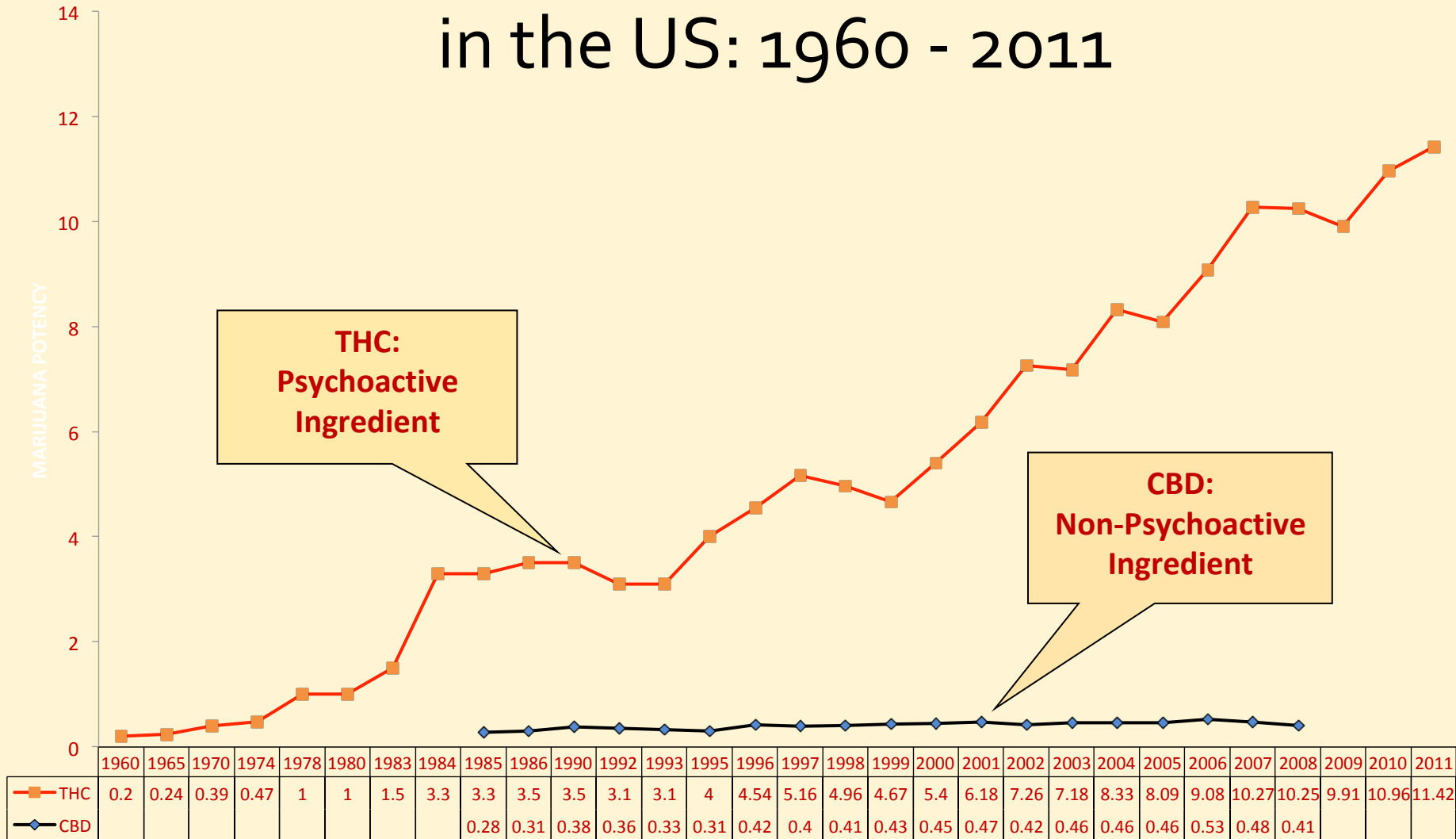
- **Those who developed marijuana dependence before age 18 showed IQ decline in adulthood.**
- The longer their dependence persisted, the greater the decline, with a decline of 8 IQ points for the most persistent users.
- **Those who began using in adulthood did not show IQ decline.**
- Quitting in adulthood did not restore functioning in those who began in adolescence.

Persistent cannabis users show neuropsychological decline from childhood to midlife

Madeline H. Meier, Avshalom Caspi, Antony Ambler, HonaLee Harrington, Renate Houts, Richard S. E. Keefe, Kay McDonald, Aimee Ward, Richie Poulton, and Terrie E. Moffitt

PNAS October 2, 2012. 109 (40) E2657-E2664

Average THC & CBD levels in the US: 1960 - 2011



Data from the NIDA-sponsored Potency Monitoring program at the University of Mississippi, showing average THC and CBD levels in samples of marijuana seized by federal, state and local governments in each year shown.

THC Concentrates



"Green Crack" wax



"Ear Wax"



Butane Hash Oil (BHO)



Hash Oil Capsules



"Budder"



"Shatter"

SMOKING



PIPE



BONG



BUBBLER



DAB



JOINT



BLUNT

BEVERAGES



TEA



SODA



ALCOHOL



MILK

Ways to
consume
marijuana

EDIBLES



CANDY



ICE CREAM



BAKED GOODS

VAPORIZING



DESKTOP VAPORIZER



PORTABLE VAPORIZER

OTHER



CAPSULES



SPRAY

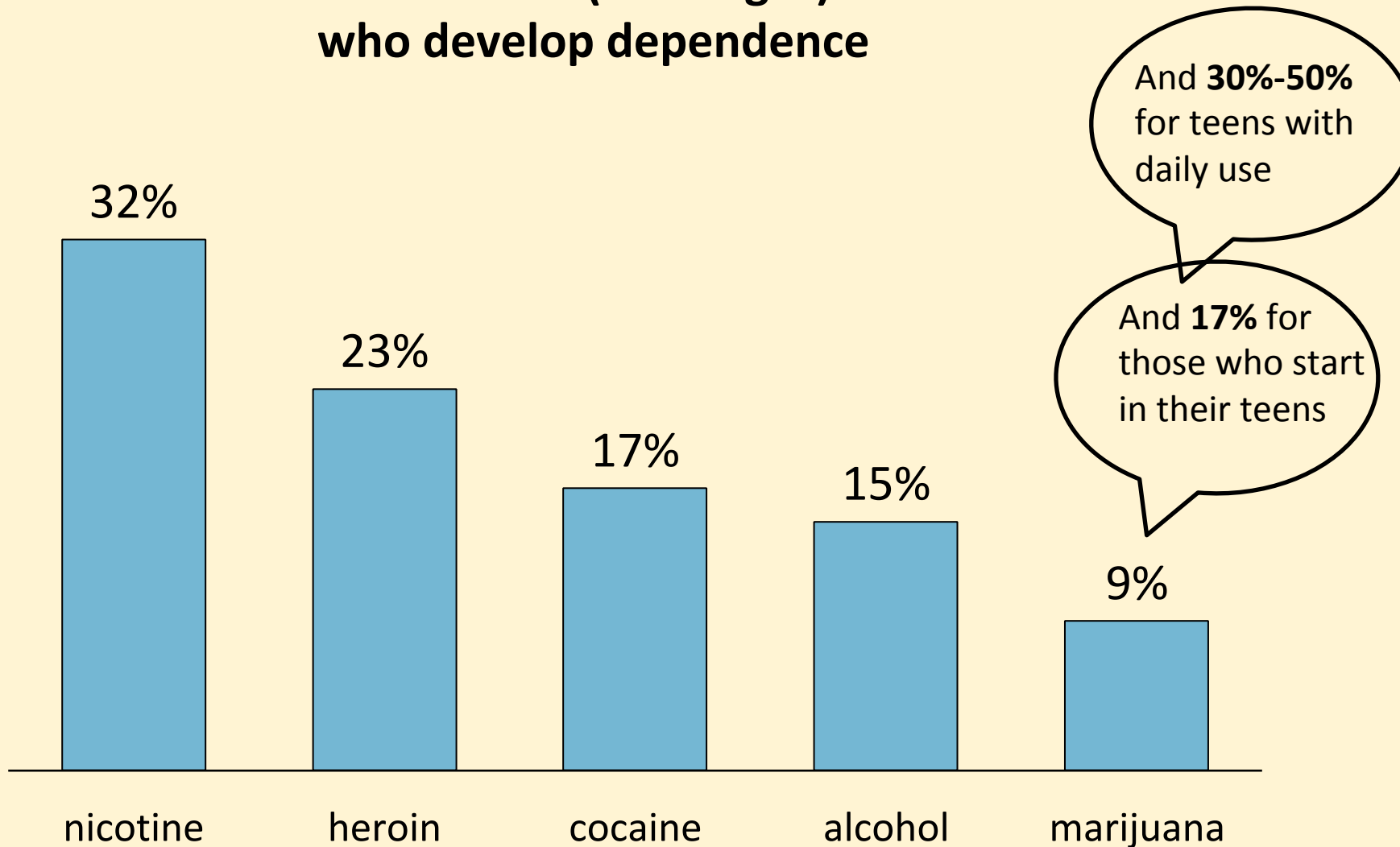


TINCTURE

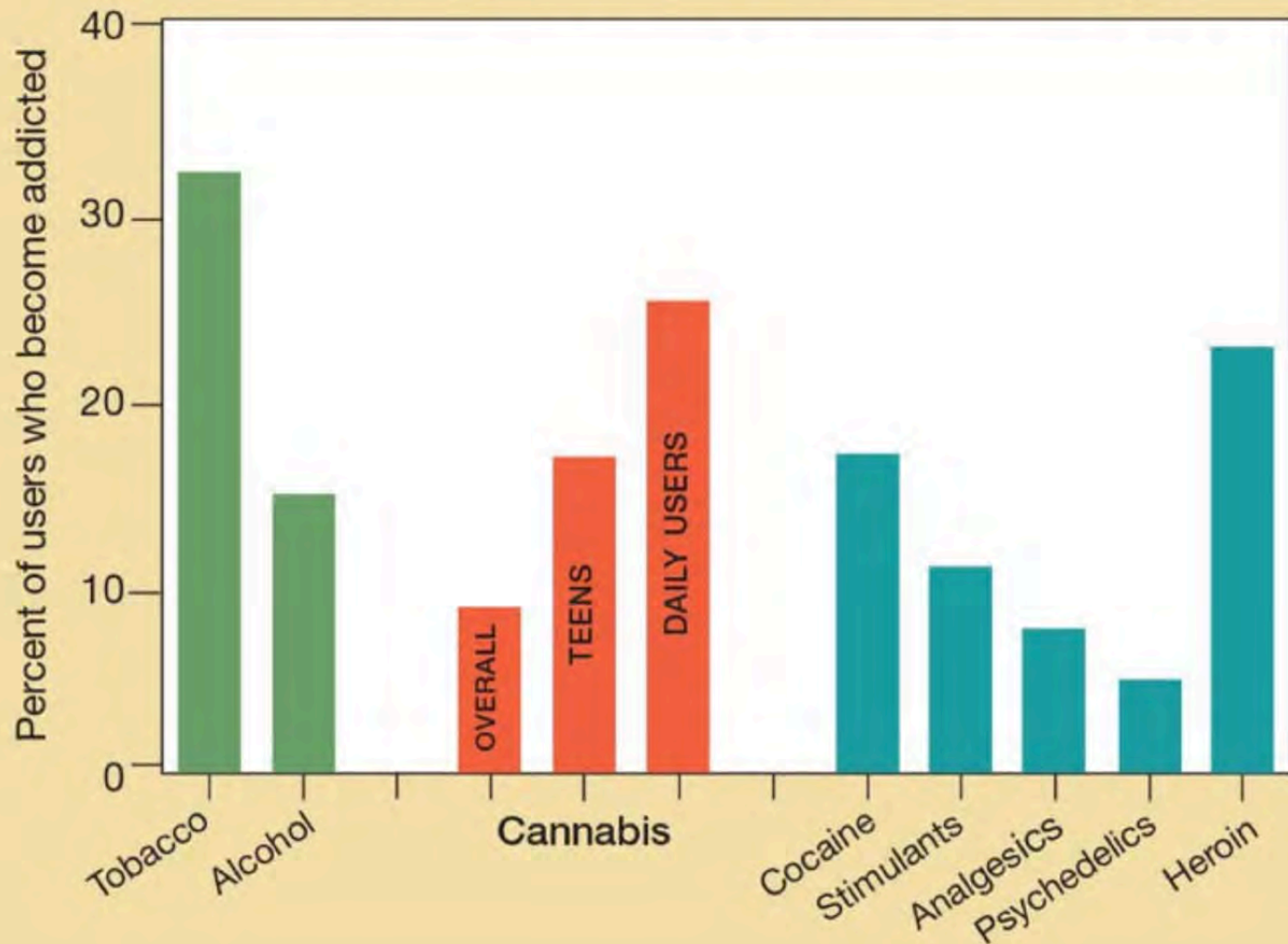


Is Marijuana Addictive?

% of users (of all ages)
who develop dependence



Comparison of addictive potential by drug type¹⁹



Gilman, 2015--<http://www.psychiatrictimes.com/special-reports/cannabis-use-young-adults-challenges-during-transition-adulthood>

Big Marijuana — Lessons from Big Tobacco

Kimber P. Richter, Ph.D., M.P.H., and Sharon Levy, M.D., M.P.H.

The United States is divided over the legalization of marijuana. Arguments in favor include protection of individual rights, elimination of criminal sentencing for minor offenses, collection of tax revenue, and elimination of the black market. Counterarguments include the

N ENGL J MED 371:5 NEJM.ORG JULY 31, 2014

399

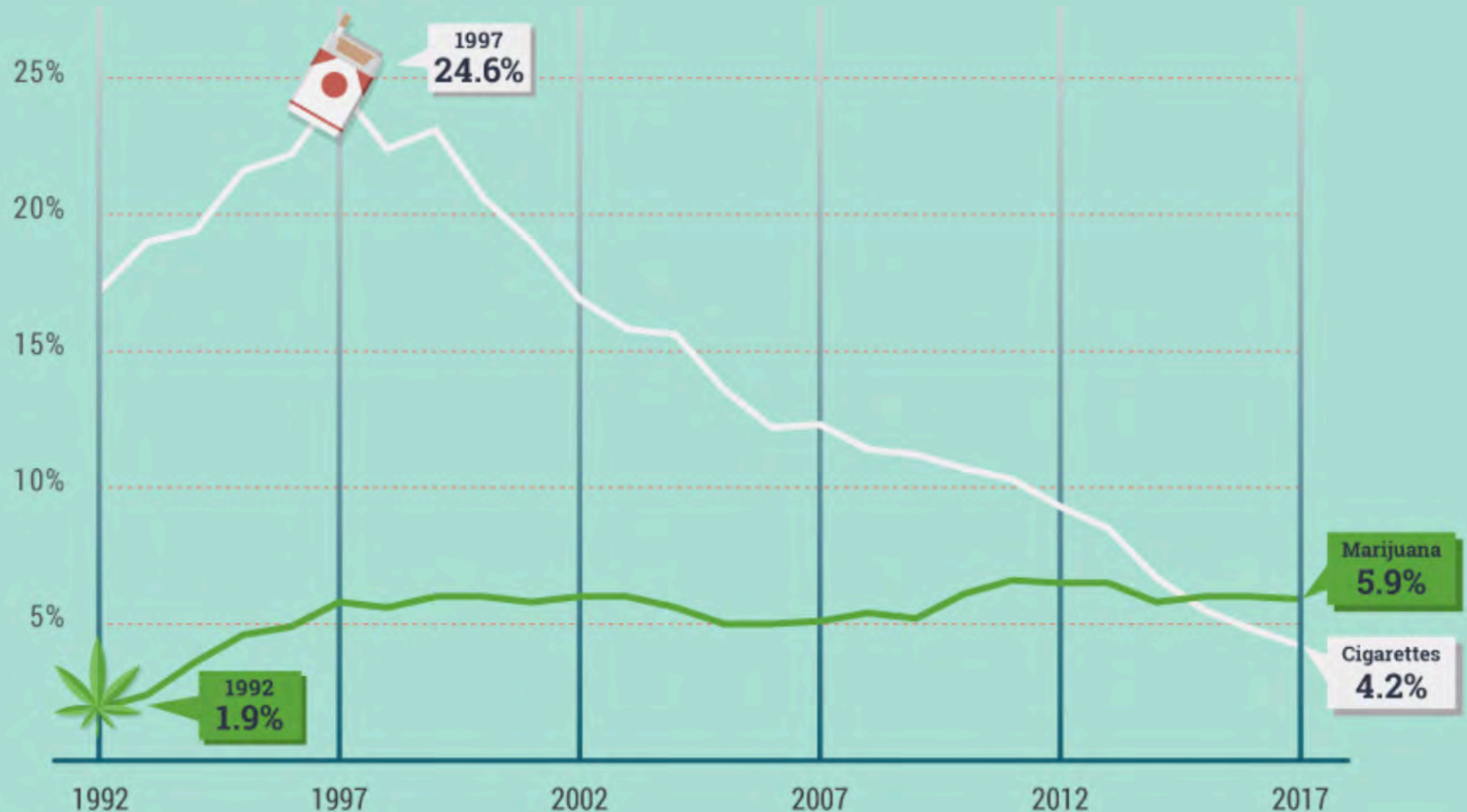
The New England Journal of Medicine

It took the medical and public health communities 50 years, millions of lives, and billions of dollars to identify the wake of illness and death left by legal, industrialized cigarettes. The free-market approach to tobacco clearly failed to protect the public's welfare and the common good: in spite of recent federal regulation, tobacco use remains the leading cause of death in the United States.

History and current evidence suggest that simply legalizing marijuana, and giving free rein to the resulting industry, is not the answer. To do so would be to once again entrust private industry with safeguarding the health of the public — a role that it is not designed to handle.

TEENS MORE LIKELY TO USE MARIJUANA THAN CIGARETTES

Daily use among 12th graders



National Institute
on Drug Abuse

DRUGABUSE.GOV



How Much Do Americans Drink?

There's a wide range.




Average number of drinks consumed per week

SOURCE: WASHINGTONPOST/WONKBLOG, "PAYING THE TAB" BY PHILIP J. COOK

Low-risk drinking limits		MEN	WOMEN
	On any single DAY	No more than 4  drinks on any day	No more than 3  drinks on any day
	Per WEEK	****AND**** No more than 14  drinks per week	****AND**** No more than 7  drinks per week
To stay low risk, keep with BOTH the single-day AND weekly limits			

Infographic: NIAAA

12 fl oz of regular beer	=	8–9 fl oz of malt liquor (shown in a 12 oz glass)	=	5 fl oz of table wine	=	1.5 fl oz shot of 80-proof spirits ("hard liquor"— whiskey, gin, rum, vodka, tequila, etc.)
						
about 5% alcohol		about 7% alcohol		about 12% alcohol		about 40% alcohol



Association of parental supply of alcohol with adolescent drinking, alcohol-related harms, and alcohol use disorder symptoms: a prospective cohort study

Richard P Mattick, Philip J Clare, Alexandra Aiken, Monika Wadolowski, Delyse Hutchinson, Jakob Najman, Tim Slade, Raimondo Bruno, Nyanda McBride, Kypros Kypri, Laura Vogl, Louisa Degenhardt

Interpretation Providing alcohol to children is associated with alcohol-related harms. There is no evidence to support the view that parental supply protects from adverse drinking outcomes by providing alcohol to their child. Parents should be advised that this practice is associated with risk, both directly and indirectly through increased access to alcohol from other sources.

Countries by their Alcohol Consumption

Rank	Country	Consumption Per Capita in Liters
1	Belarus	17.5
2	Moldova	16.8
3	Lithuania	15.4
4	Russian Federation	15.1
5	Romania	14.4
6	Ukraine	13.9
7	Andorra	13.8
8	Hungary	13.3
9	Czech Republic	13
10	Slovakia	13
11	Portugal	12.9
12	Serbia	12.8
13	South Korea	12.3
14	Finland	12.3
15	Latvia	12.3
16	Croatia	12.2
17	France	12.2
18	Australia	12.2
19	Luxembourg	11.9
20	Ireland	11.9
21	Germany	11.8
22	Denmark	11.4
23	Bulgaria	11.4
24	Belgium	11
25	South Africa	11



Adverse Childhood Experiences – ACEs

Emotional Neglect

Abuse

Household Dysfunction

Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults

The Adverse Childhood Experiences (ACE) Study

Vincent J. Felitti, MD, FACP, Robert F. Anda, MD, MS, Dale Nordenberg, MD, David F. Williamson, MS, PhD, Alison M. Spitz, MS, MPH, Valerie Edwards, BA, Mary P. Koss, PhD, James S. Marks, MD, MPH

Background: The relationship of health risk behavior and disease in adulthood to the breadth of exposure to childhood emotional, physical, or sexual abuse, and household dysfunction during childhood has not previously been described.

Methods: A questionnaire about adverse childhood experiences was mailed to 13,494 adults who had completed a standardized medical evaluation at a large HMO; 9,508 (70.5%) responded. Seven categories of adverse childhood experiences were studied: psychological, physical, or sexual abuse; violence against mother; or living with household members who were substance abusers, mentally ill or suicidal, or ever imprisoned. The number of categories of these adverse childhood experiences was then compared to measures of adult risk behavior, health status, and disease. Logistic regression was used to adjust for effects of demographic factors on the association between the cumulative number of categories of childhood exposures (range: 0–7) and risk factors for the leading causes of death in adult life.

Results: More than half of respondents reported at least one, and one-fourth reported ≥ 2 categories of childhood exposures. We found a graded relationship between the number of categories of childhood exposure and each of the adult health risk behaviors and diseases that were studied ($P < .001$). Persons who had experienced four or more categories of childhood exposure, compared to those who had experienced none, had 4- to 12-fold increased health risks for alcoholism, drug abuse, depression, and suicide attempt; a 2- to 4-fold increase in smoking, poor self-rated health, ≥ 50 sexual intercourse partners, and sexually transmitted disease; and a 1.4- to 1.6-fold increase in physical inactivity and severe obesity. The number of categories of adverse childhood exposures showed a graded relationship to the presence of adult diseases including ischemic heart disease, cancer, chronic lung disease, skeletal fractures, and liver disease. The seven categories of adverse childhood experiences were strongly interrelated and persons with multiple categories of childhood exposure were likely to have multiple health risk factors later in life.

Conclusions: We found a strong graded relationship between the breadth of exposure to abuse or household dysfunction during childhood and multiple risk factors for several of the leading causes of death in adults.

Medical Subject Headings (MeSH): child abuse, sexual, domestic violence, spouse abuse, children of impaired parents, substance abuse, alcoholism, smoking, obesity, physical activity, depression, suicide, sexual behavior, sexually transmitted diseases, chronic obstructive pulmonary disease, ischemic heart disease. (Am J Prev Med 1998;14:245–258) © 1998 American Journal of Preventive Medicine

Finding Your ACE Score

While you were growing up, during your first 18 years of life:

1. Did a parent or other adult in the household **often or very often**...
Swear at you, insult you, put you down, or humiliate you?
or
Act in a way that made you afraid that you might be physically hurt?
Yes No If yes enter 1 _____
2. Did a parent or other adult in the household **often or very often**...
Push, grab, slap, or throw something at you?
or
Ever hit you so hard that you had marks or were injured?
Yes No If yes enter 1 _____
3. Did an adult or person at least 5 years older than you **ever**...
Touch or fondle you or have you touch their body in a sexual way?
or
Attempt or actually have oral, anal, or vaginal intercourse with you?
Yes No If yes enter 1 _____
4. Did you **often or very often** feel that ...
No one in your family loved you or thought you were important or special?
or
Your family didn't look out for each other, feel close to each other, or support each other?
Yes No If yes enter 1 _____
5. Did you **often or very often** feel that ...
You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you?
or
Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?
Yes No If yes enter 1 _____
6. Were your parents **ever** separated or divorced?
Yes No If yes enter 1 _____
7. Was your mother or stepmother:
Often or very often pushed, grabbed, slapped, or had something thrown at her?
or
Sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard?
or
Ever repeatedly hit at least a few minutes or threatened with a gun or knife?
Yes No If yes enter 1 _____
8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?
Yes No If yes enter 1 _____
9. Was a household member depressed or mentally ill, or did a household member attempt suicide?
Yes No If yes enter 1 _____
10. Did a household member go to prison?
Yes No If yes enter 1 _____

Now add up your "Yes" answers: _____ This is your ACE Score.

WHAT ARE THEY?

ACEs are ADVERSE CHILDHOOD EXPERIENCES

HOW PREVALENT ARE ACEs?

The ACE study* revealed the following estimates:

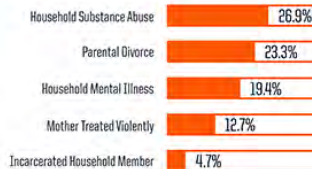
ABUSE



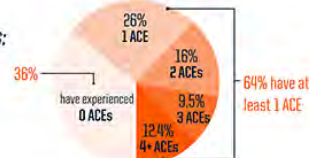
NEGLECT



HOUSEHOLD DYSFUNCTION



Of 17,000 ACE study participants:



The three types of ACEs include

ABUSE



Physical



Emotional



Sexual

NEGLECT



Physical



Emotional

HOUSEHOLD DYSFUNCTION



Mental Illness



Incarcerated Relative



Mother treated violently



Substance Abuse



Divorce

WHAT IMPACT DO ACEs HAVE?

As the number of ACEs increases, so does the risk for negative health outcomes



Possible Risk Outcomes:

BEHAVIOR



Lack of physical activity



Smoking



Alcoholism



Drug use

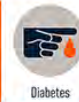


Missed work

PHYSICAL & MENTAL HEALTH



Severe obesity



Diabetes



Depression



Suicide attempts



STDs



Heart disease



Cancer



Stroke



COPD



Broken bones

Talk Early, Talk Often

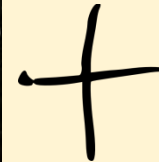
“Delay, Delay, Delay or Avoid Altogether”



Genetics



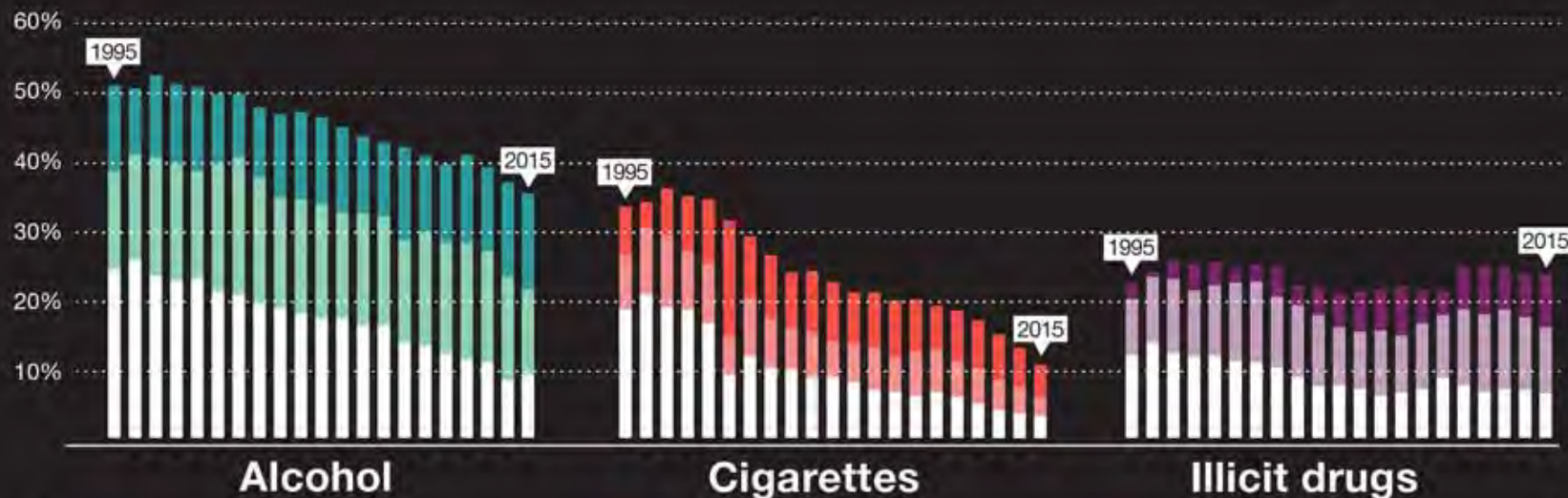
Trauma






Early Use




LAST TWO DECADES OF ALCOHOL, CIGARETTE, AND ILLICIT DRUG USE*




*Past-month use



2015

 35.3% OF 12TH GRADERS
 21.5% OF 10TH GRADERS
 9.7% OF 8TH GRADERS

 11.4% OF 12TH GRADERS
 6.3% OF 10TH GRADERS
 3.6% OF 8TH GRADERS

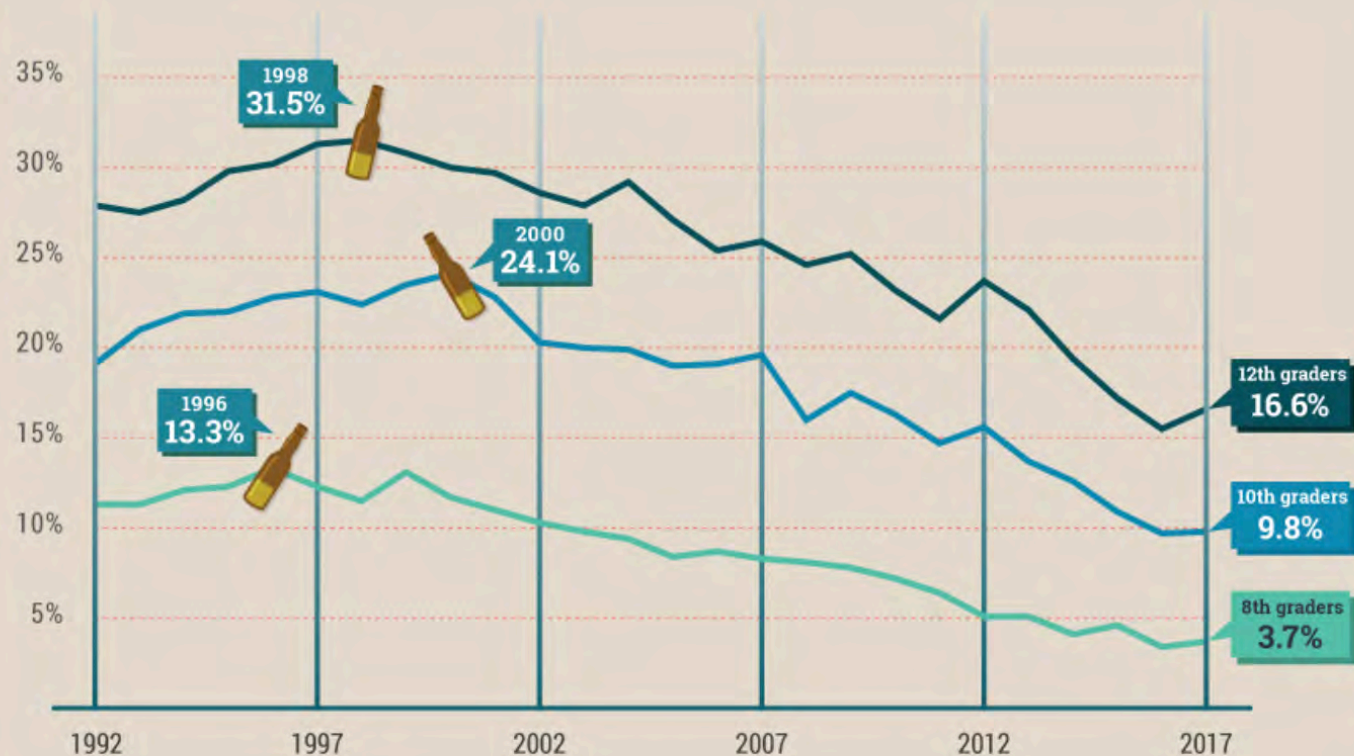
 23.6% OF 12TH GRADERS
 16.5% OF 10TH GRADERS
 8.1% OF 8TH GRADERS



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BINGE DRINKING RATES STEADY AFTER DECADES OF DECLINE



**Binge drinking is defined as having 5 or more drinks in a row in the last 2 weeks.*

BINGE DRINKING APPEARS TO HAVE LEVELED OFF THIS YEAR, BUT IS SIGNIFICANTLY LOWER THAN PEAK YEARS.



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on Drug Abuse

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TOBACCO PRODUCT USE BY HIGH SCHOOL STUDENTS (2011-2016)

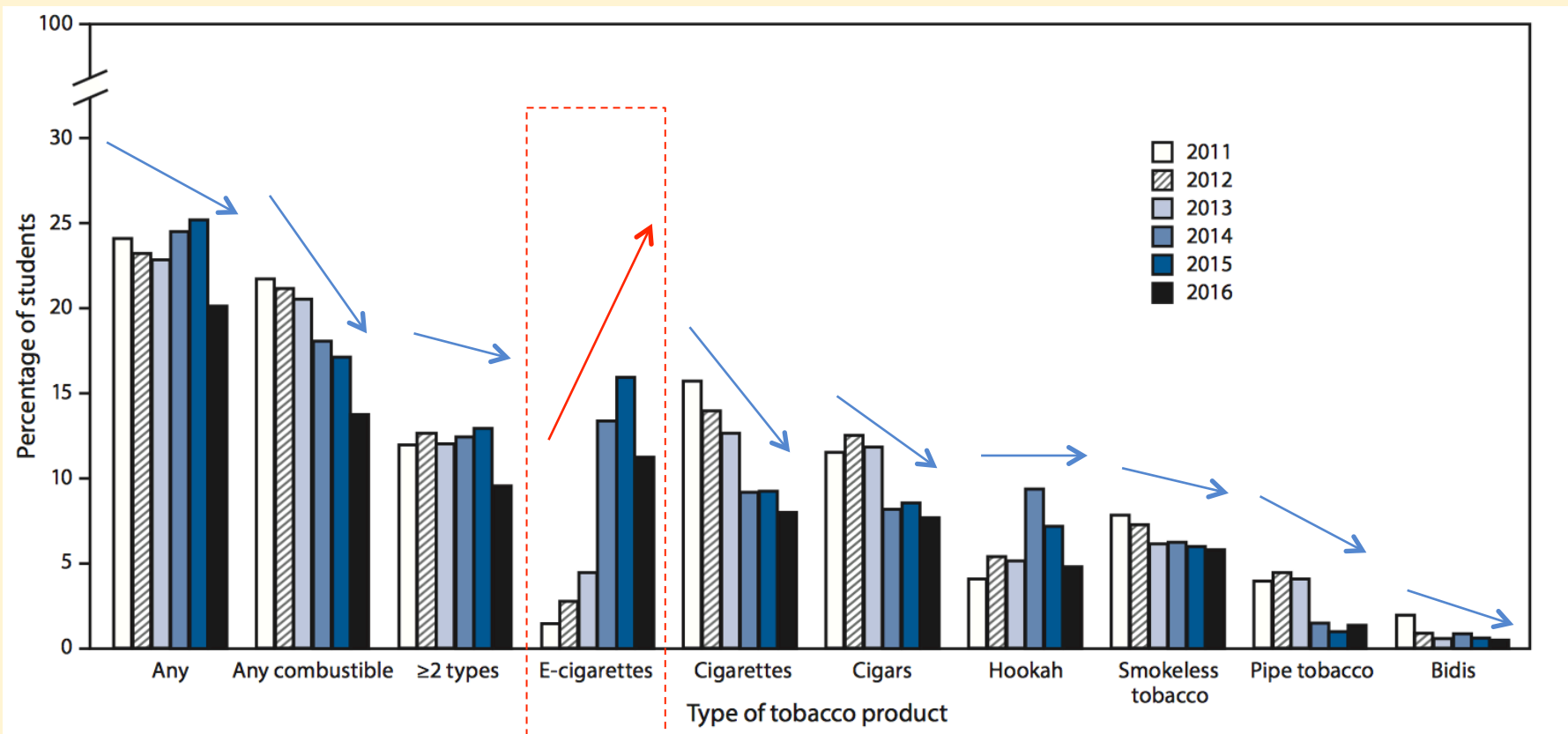
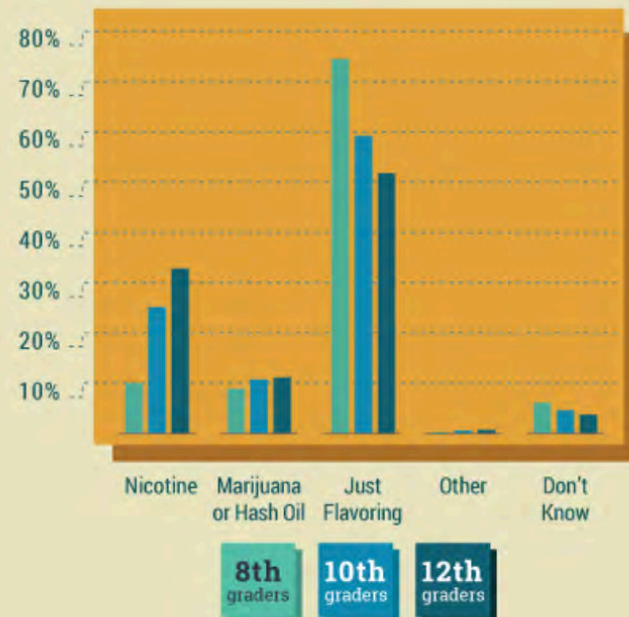


Figure 1. Estimated percentage of **high school students** who currently use any tobacco products, any combustible tobacco products, ≥ 2 tobacco products, and selected tobacco products – National Youth Tobacco Survey, United States. 2011-2016.

PAST-YEAR E-VAPORIZER USE AND WHAT TEENS ARE INHALING



When asked what they thought was in the e-vaporizer mist students inhaled the last time they smoked, these were their responses:



NEARLY 1 IN 3 STUDENTS IN 12TH GRADE REPORT PAST-YEAR USE OF E-VAPORIZERS, RAISING CONCERNS ABOUT THE IMPACT ON THEIR LONG-TERM HEALTH.



National Institute
on Drug Abuse

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The Nicotine Content of a Sample of E-cigarette Liquid Manufactured in the United States

Raymond, Barrett H. BSN, RN, FNP-S, NREMT-P; Collette-Merrill, Katreena PhD, RN; Harrison, Roger G. PhD; Jarvis, Sabrina DNP, FNP-BC, ACNP-BC, FAANP; Rasmussen, Ryan Jay MS, RN, FNP

Journal of Addiction Medicine: December 26, 2017 - Volume Publish Ahead of Print - Issue - p
doi: 10.1097/ADM.0000000000000376
Original Research: PDF Only

BUY PAP

Abstract

Author Information

SD = 3.3) nicotine. The labeled 18 mg/mL samples measured as little as 35% less nicotine and as much as 52% greater nicotine. In the 35 samples labeled 0 mg/mL, nicotine was detected (>0.01 mg/mL) in 91.4% of the samples (range 0–23.9 mg/mL; $M = 2.9$, $SD = 7.2$). Six samples from 2 manufacturers labeled as 0 mg/mL were found to contain nicotine in amounts ranging from 5.7 to 23.9 mg/mL.

popular flavors from each manufacturer were purchased in nicotine concentrations of 0 and 18 mg/mL. Of the samples purchased ($n = 70$), all were labeled as produced in the United States of America. The researchers anonymized the samples before sending them to an independent university laboratory for testing.

Results: The 35 e-liquid samples labeled 18 mg/mL nicotine measured between 11.6 and 27.4 mg/mL ($M = 18.7$, $SD = 3.3$) nicotine. The labeled 18 mg/mL samples measured as little as 35% less nicotine and as much as 52% greater nicotine. In the 35 samples labeled 0 mg/mL, nicotine was detected (>0.01 mg/mL) in 91.4% of the samples (range 0–23.9 mg/mL; $M = 2.9$, $SD = 7.2$). Six samples from 2 manufacturers labeled as 0 mg/mL were found to contain nicotine in amounts ranging from 5.7 to 23.9 mg/mL.

Conclusion: This study demonstrates the nicotine labeling inaccuracies present in current e-liquid solutions produced in the United States. Incorrect labeling poses a significant risk to consumers and supports the recent regulation changes enacted by the US Food and Drug Administration. Additional routine testing of nicotine concentrations should be conducted to evaluate the effectiveness of the regulations on future e-liquid production.

One Mad Hit Juice Box

- [NEwhere Inc. d/b/a Mad Hatter Juice](#)



E-liquid



Food product

Whip'd Strawberry

- [Cosmic Fog Vapors d/b/a Next Day Vapor Products](#)
- [Elite Vaporworks](#)



E-liquid



Food product

V'Nilla Cookies & Milk

- [Tinted Brew, Inc.](#)
- [Fog It Up](#)



E-liquid



Food product

JUUL e-cigarettes

Some e-cigarette critics are calling the JUUL e-cigarette the “Apple of vaping” or the “iPhone of vaping.” With its relatively low entry price, sleek portable design, ease of use, and nicotine head rush it generates for users, JUULS are catching on with younger people.

JUUL flavor pods



*Contains one JUULpod each of Virginia Tobacco, Cool Mint, Fruit Medley and Creme Brulee. Each JUULpod contains 0.7mL with 5% nicotine by weight, approximately equivalent to 1 pack of cigarettes or 200 puffs.

The design of the e-cigarette is about the same size as a cigarette and weighs a couple of grams.

Charging dock
It looks like a USB thumb drive

Body



USB charging dock

The battery is charged by dropping the body on a magnetic USB adapter. It takes an hour to fully charge and will last up to 200 puffs, a full day of regular use.

cigarette's body is designed to contain a built-in battery.



Teenage Brains are Malleable and Vulnerable





Have Smartphones Destroyed a Generation?

More comfortable online than out partying, post-Millennials are safer, physically, than adolescents have ever been. But they're on the brink of a mental-health crisis.

The
Atlantic

[JEAN M. TWENG](#)

[SEPTEMBER 2017 ISSUE](#)



JUNE 15, 2015

TIME

They're the most
**powerful
painkillers**
ever invented.

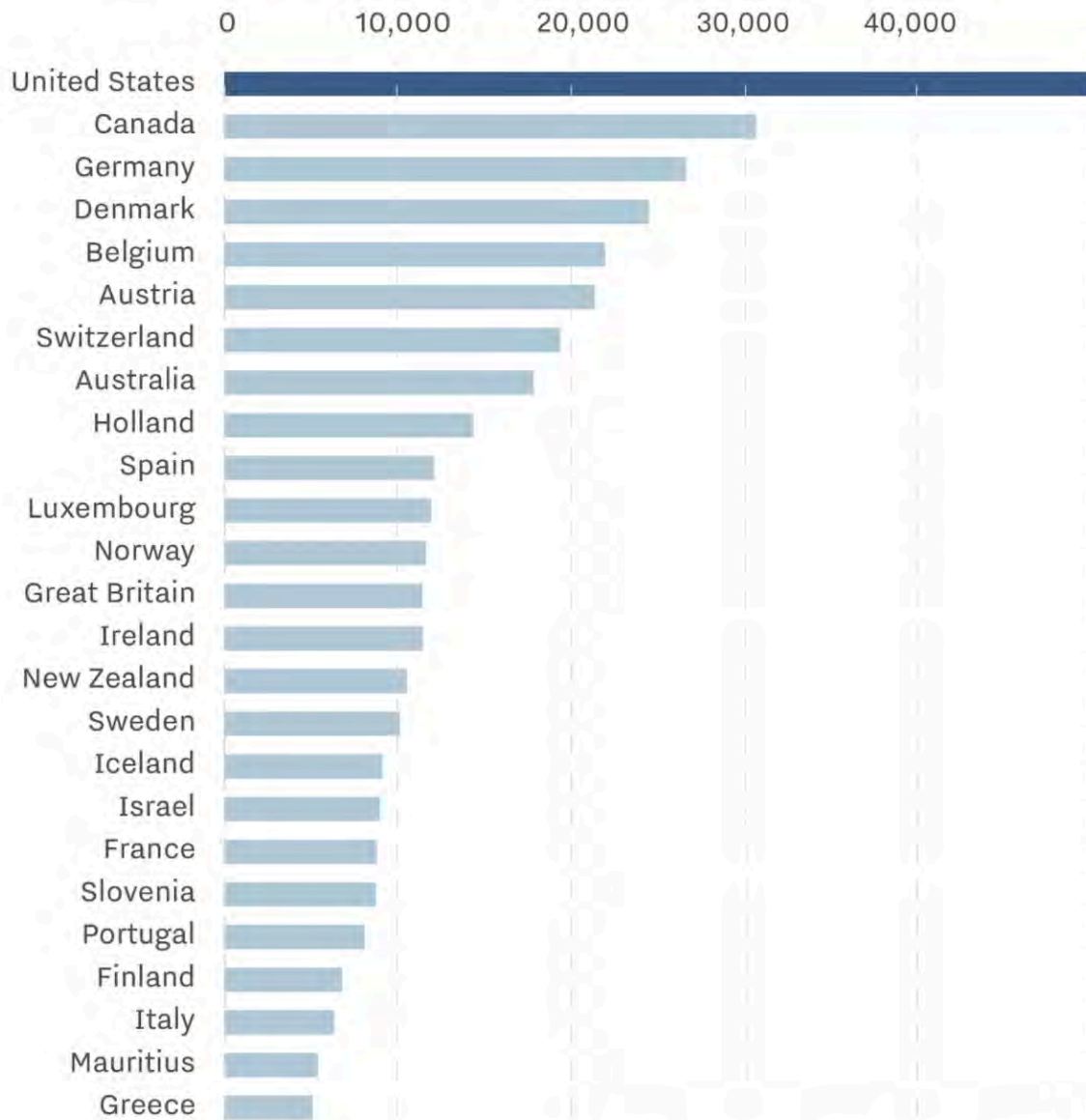
And they're creating
the worst addiction
crisis America
has ever seen.

By Massimo Calabresi



time.com

Standard daily opioid dose for every 1 million people



Source: United Nations International Narcotics Control Board

Credit: Sarah Frostenson

Vox

Chronic Use of Opioid Analgesics in Non-Malignant Pain: Report of 38 Cases

Russell K. Portenoy and Kathleen M. Foley

Pain Service, Department of Neurology, Memorial Sloan-Kettering Cancer Center, and Department of Neurology, Cornell University Medical College, New York, NY 10021 (U.S.A.)

(Received 10 June 1985, accepted 28 October 1985)

Summary

Thirty-eight patients maintained on opioid analgesics for non-malignant pain were retrospectively evaluated to determine the indications, course, safety and efficacy of this therapy. Oxycodone was used by 12 patients, methadone by 7, and levorphanol by 5; others were treated with propoxyphene, meperidine, codeine, pentazocine, or some combination of these drugs. Nineteen patients were treated for four or more years at the time of evaluation, while 6 were maintained for more than 7 years. Two-thirds required less than 20 morphine equivalent mg/day and only 4 took more than 40 mg/day. Patients occasionally required escalation of dose and/or hospitalization for exacerbation of pain; doses usually returned to a stable baseline afterward. Twenty-four patients described partial but acceptable or fully adequate relief of pain, while 14 reported inadequate relief. No patient underwent a surgical procedure for pain management while receiving therapy. Few substantial gains in employment or social function could be attributed to the institution of opioid therapy. No toxicity was reported and management became a problem in only 2 patients, both with a history of prior drug abuse. A critical review of patient characteristics, including data from the 16 Personality Factor Questionnaire in 24 patients, the Minnesota Multiphasic Personality Inventory in 23, and detailed psychiatric evaluation in 6, failed to disclose psychological or social variables capable of explaining the success of long-term management. We conclude that opioid maintenance therapy can be a safe, salutary and more humane alternative to the options of surgery or no treatment in those patients with intractable non-malignant pain and no history of drug abuse.

Drug Deaths in America Are Rising Faster Than Ever

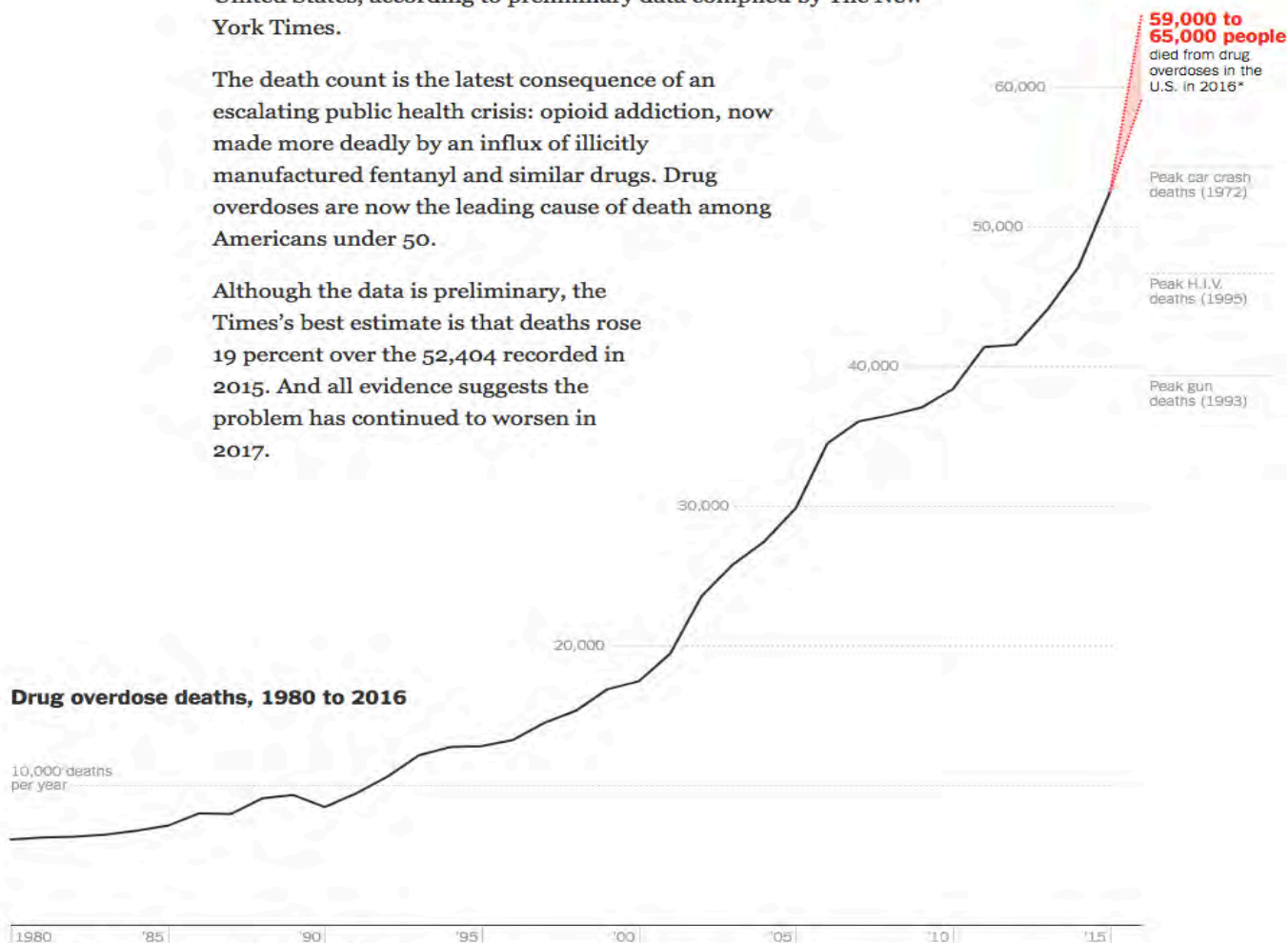
By **JOSH KATZ** JUNE 5, 2017

New data compiled from hundreds of health agencies reveals the extent of the drug overdose epidemic last year.

AKRON, Ohio — Drug overdose deaths in 2016 most likely exceeded 59,000, the largest annual jump ever recorded in the United States, according to preliminary data compiled by The New York Times.

The death count is the latest consequence of an escalating public health crisis: opioid addiction, now made more deadly by an influx of illicitly manufactured fentanyl and similar drugs. Drug overdoses are now the leading cause of death among Americans under 50.

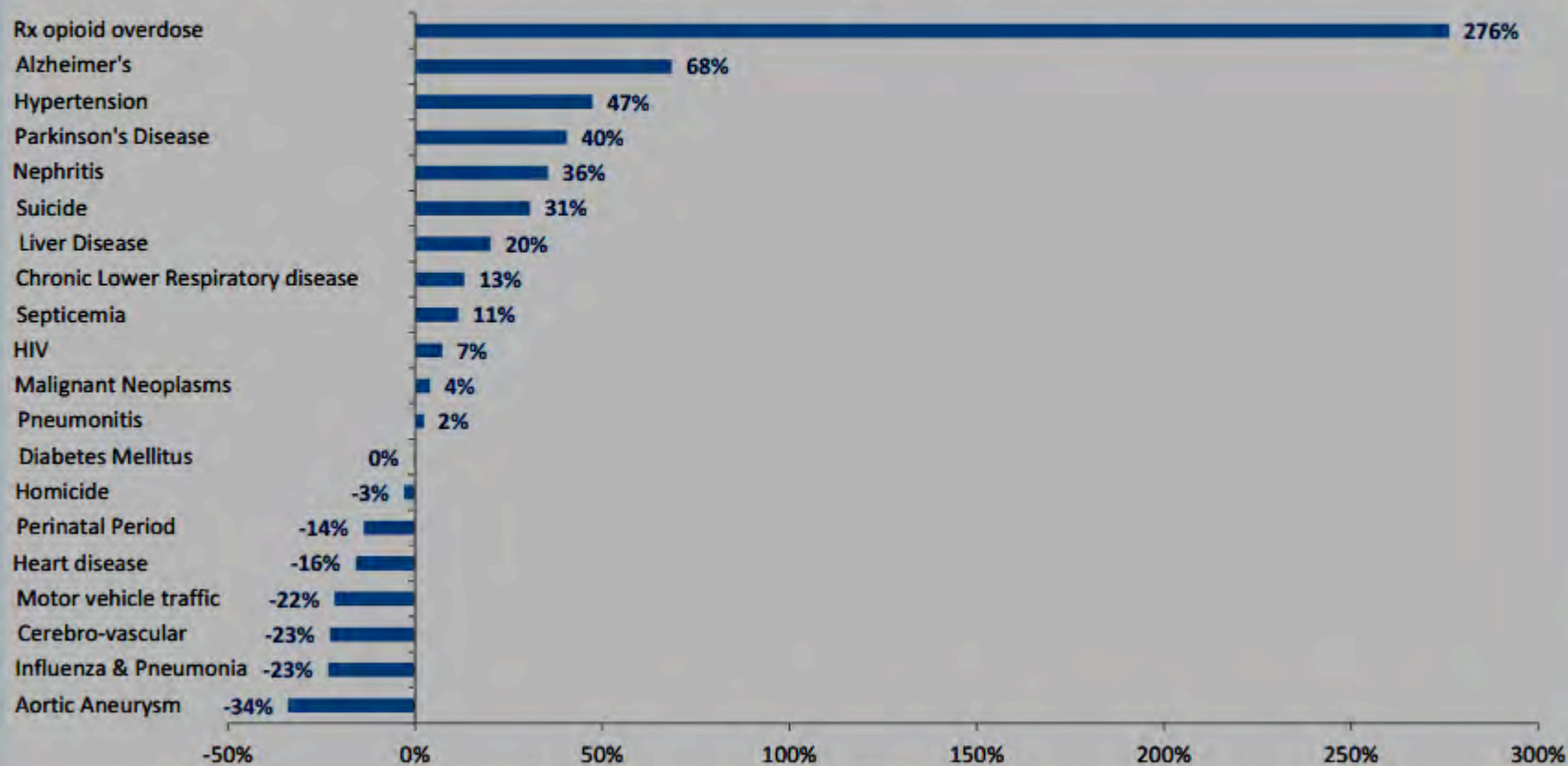
Although the data is preliminary, the Times's best estimate is that deaths rose 19 percent over the 52,404 recorded in 2015. And all evidence suggests the problem has continued to worsen in 2017.



*Estimate based on preliminary data

Opioid pain reliever-related overdose deaths increasing at a faster rate than deaths from any major cause

% change in number of deaths, United States, 2000-2010



Deaths Ripples Across America

By HAEYOUN PARK and MATTHEW BLOCH JAN. 19, 2016



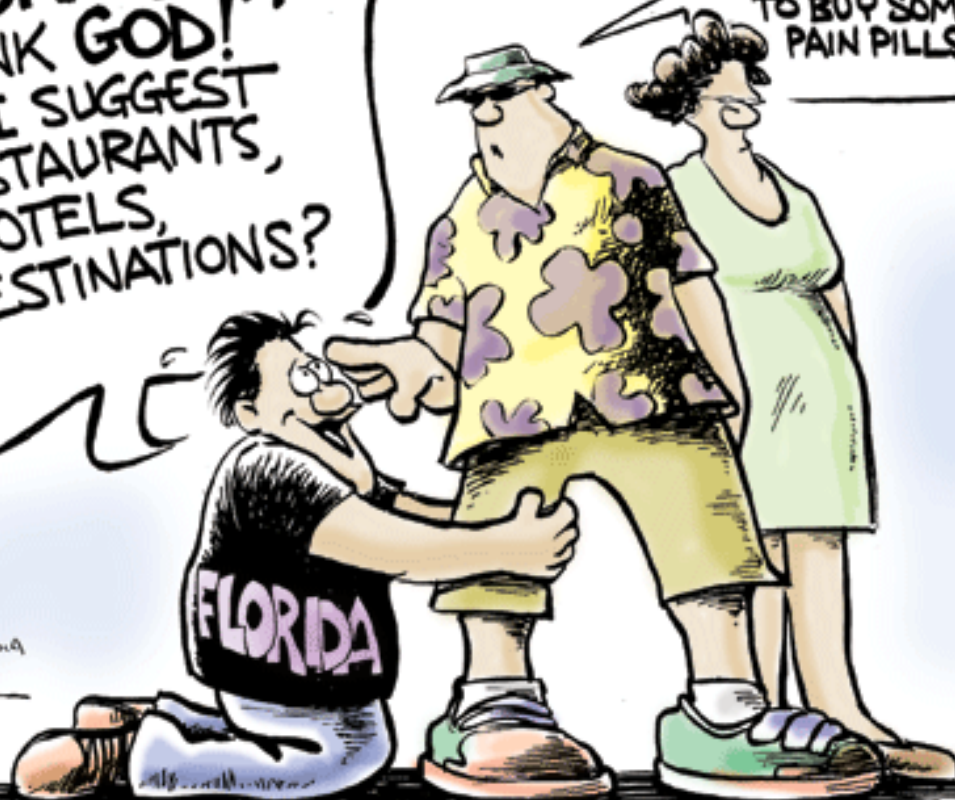
NYT January 19, 2016



TOURISTS!!
THANK GOD!!
MAY I SUGGEST
RESTAURANTS,
HOTELS,
DESTINATIONS?

WE'RE
JUST HERE
TO BUY SOME
PAIN PILLS.

©2009
TRIUMPH MEDIA
7-21
SOUTH FLORIDA
SUN-SENTINEL



Florida Shutting 'Pill Mill' Clinics



Tim Chapman/Miami Herald, via Associated Press

At an Aug. 15 news conference, Florida officials displayed prescription drugs that were surrendered to the state by pain clinics.

By LIZETTE ALVAREZ

Published: August 31, 2011

WEST PALM BEACH, Fla. — Florida has long been the nation's center of the illegal sale of prescription drugs: Doctors here bought 89 percent of all the Oxycodone sold in the country last year. At its peak, so many out-of-staters flocked to Florida to buy drugs at more than 1,000 pain clinics that the state earned the nickname "Oxy Express."

Related

Times Topics: [OxyContin \(Drug\)](#)
[Prescription Drug Abuse](#)

[Enlarge This Image](#)



Joe Raedle/Getty Images

Florida Gov. Rick Scott attends a

But with the help of tougher laws, officials have moved aggressively this year to shut down so-called pill mills and disrupt the pipeline that moves the drugs north. In the past year, more than 400 clinics were either shut down or closed their doors.

Prosecutors have indicted dozens of pill mill operators, and nearly 80 doctors have seen their licenses suspended for prescribing mass quantities of pills without clear medical need.

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A cap, containing what looks like a dusting of heroin, sells for \$10.



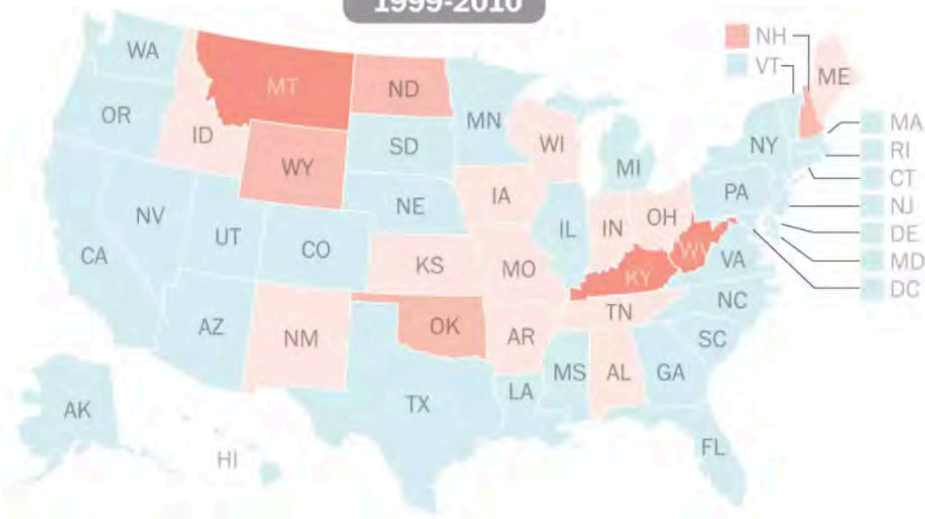
DEATHS PER 100,000 PEOPLE. AGE 25 TO 44

Decline Increase up to 10 Increase up to 20 More than 20

2010-2015

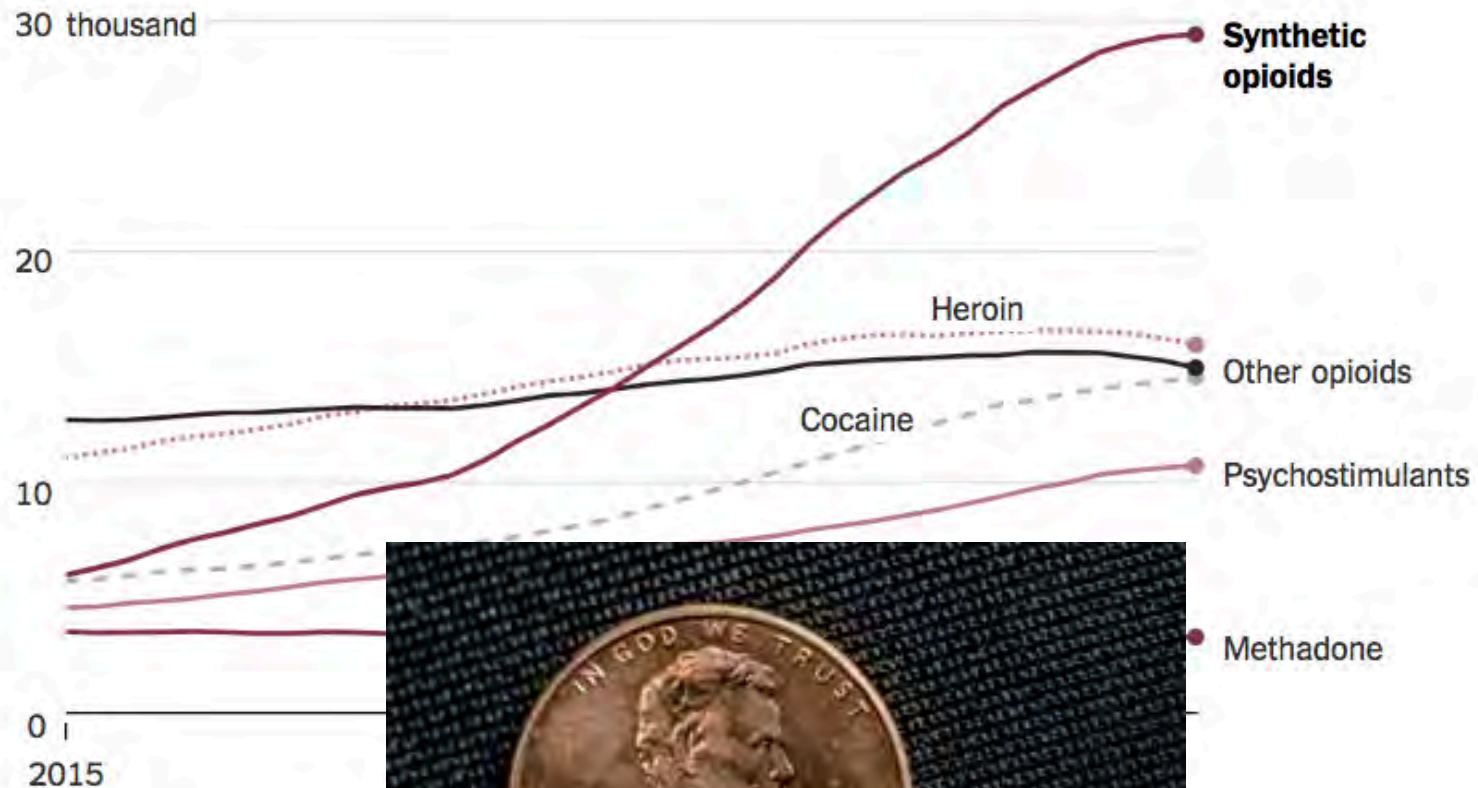


1999-2010



Synthetic Opioids Are Driving Up the Overdose Rate

Overdose deaths in thousands in preceding 12 months



Note: These numbers are preliminary. Some deaths involve more than one substance.

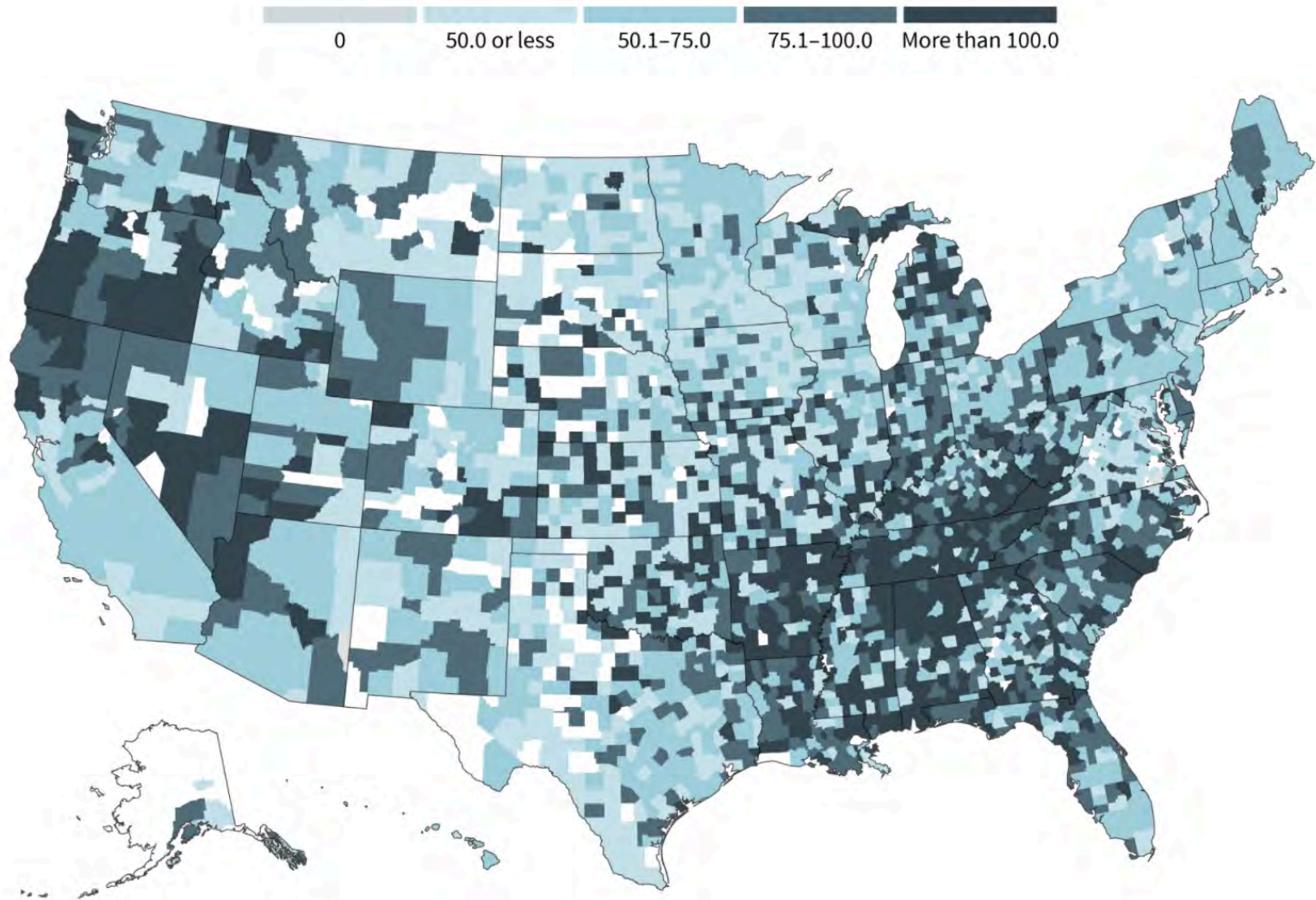
By The New York Times |



These numbers are not completed.

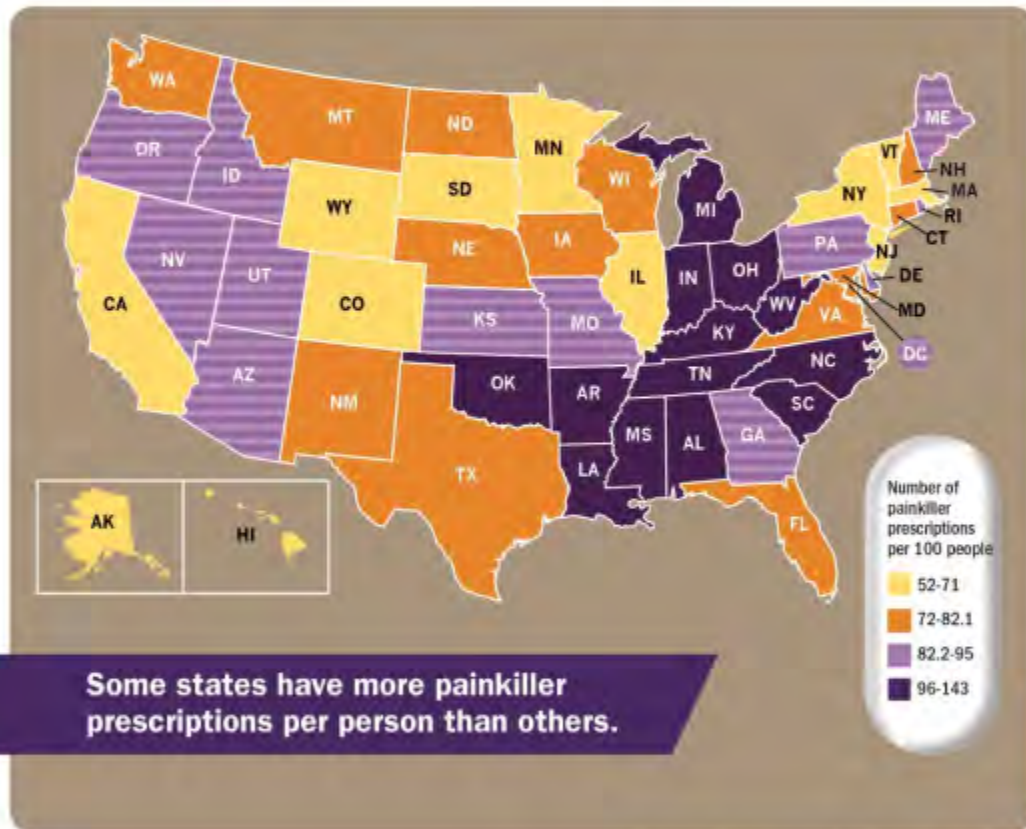
on

The map below shows the amount of retail opioid prescriptions dispensed per 100 people in 2016.



Note: Counties with insufficient data are left blank.

Opioid pain reliever prescribing rates vary by state



SOURCE: CDC Vital Signs, July 2014. cdc.gov/vitalsigns.

6. A large part of the problem has been the rise of of painkillers and heroin, especially in the Northeast.

(Map shows the drug most commonly cited in drug treatment admissions in each state)

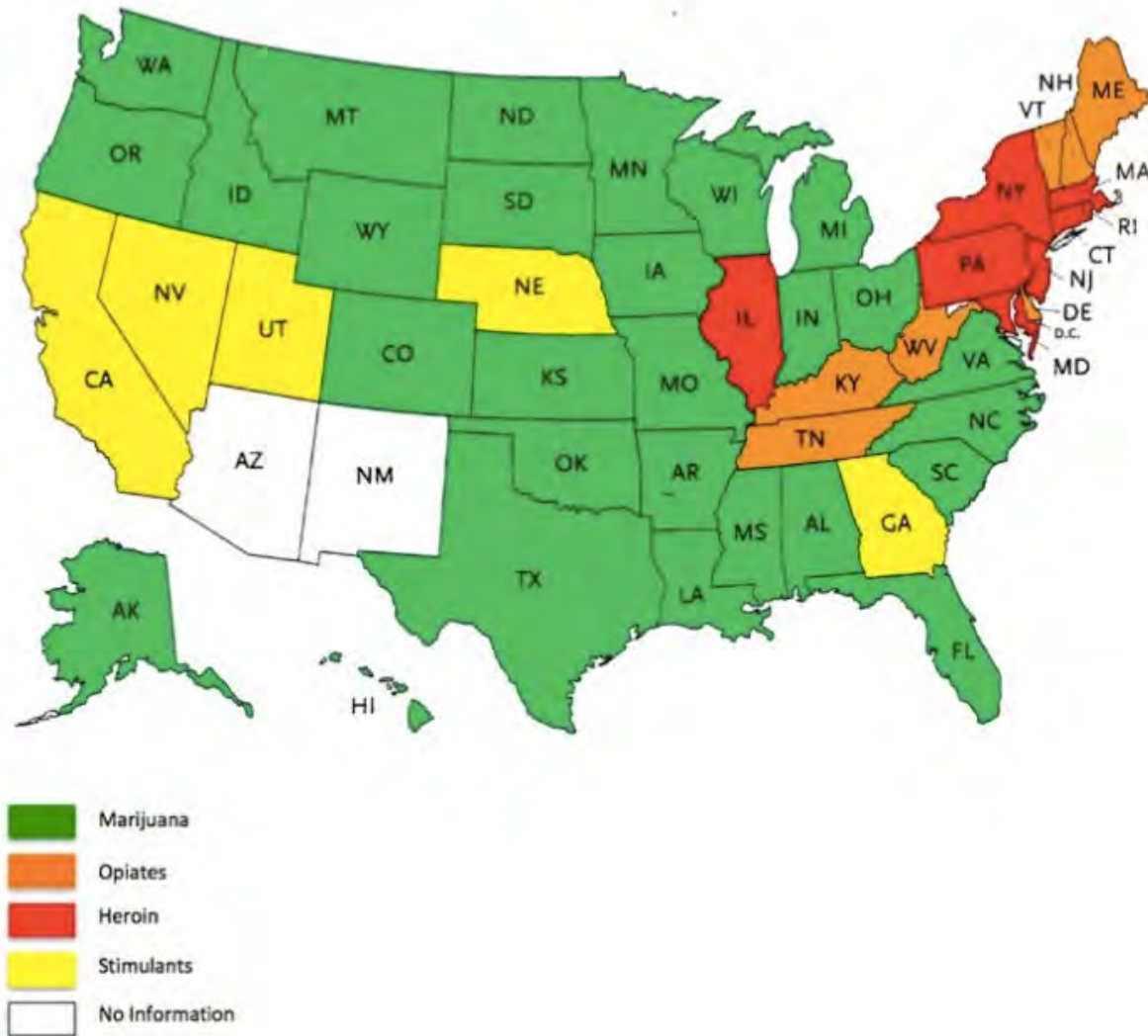
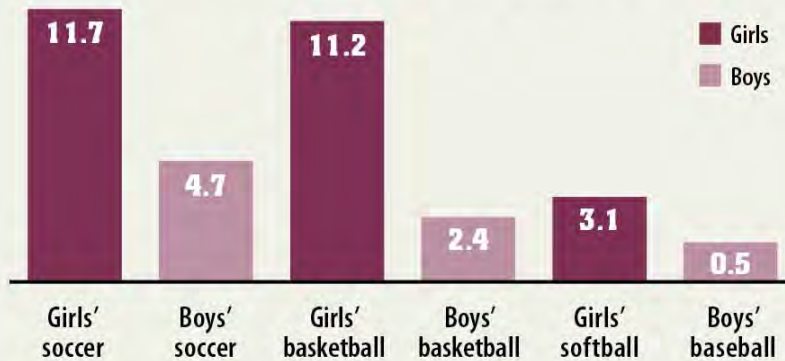




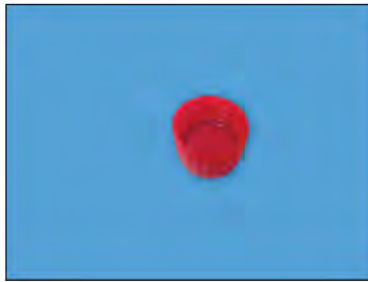
FIGURE 2 High school ACL injury rates

High school anterior cruciate ligament (ACL) injury rates per 100,000 athlete exposures (AEs) by sport and sex. (An athlete exposure is 1 athlete participating in 1 practice or competition.)



Adapted from Comstock RD, et al.³





		
<p>HELP THOSE IN NEED</p>	<p>GIVE OVERDOSE RESCUE</p>	<p>HOPE FOR A LIFE SAVED</p>

Save a Life

Learn how to respond to an overdose emergency

Get Naloxone Now is an online resource to train people to respond effectively to an opioid-associated overdose emergency. Get Naloxone Now advocates for widespread access to overdose education and training in how to administer naloxone, the life-saving antidote for opioid-associated overdose. Get Naloxone Now seeks to increase the number of lives saved by bystanders and professional first responders (police officers, firefighters and EMTs). Find out how you can contribute to reducing overdose deaths by accessing our online training modules.

INDIVIDUALS-GET TRAINED!

In as little as 20 minutes, you can learn techniques to save the life of a loved-one, friend, co-worker, neighbor ... anyone ... who is experiencing an overdose caused by prescription narcotics or heroin. You can also find out where you can obtain the lifesaving, easy-to-use antidote, naloxone, as well as access relevant

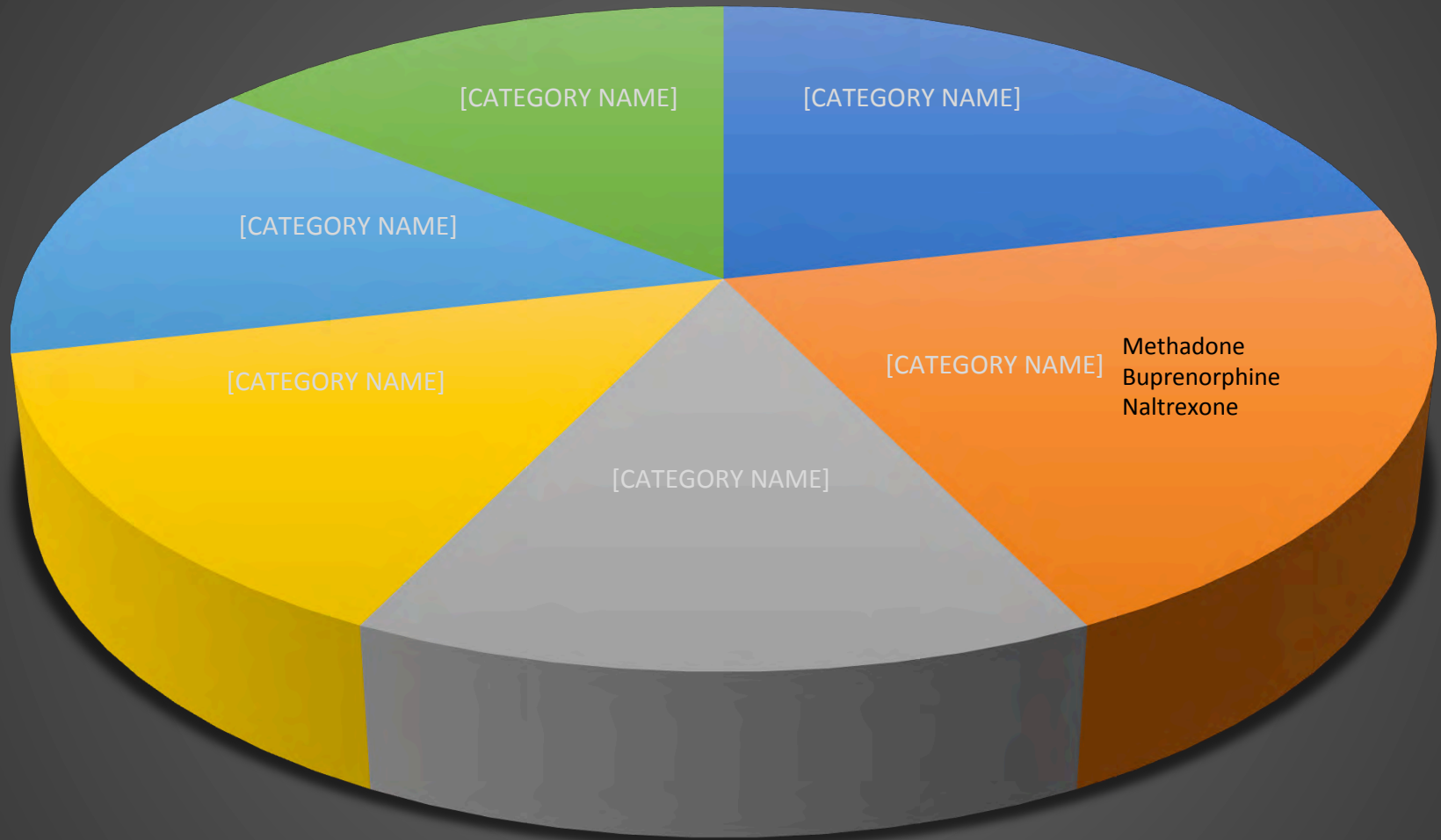
INSTITUTIONAL PROGRAM

Central to our mission to save lives is our institutional program. Targeted online training is available to professional first responders (police officers, firefighters, EMTs) through use of our first responder computer-based module.

HOW CAN YOU HELP

Our computer-based training modules can help you give someone a second chance, and spare those who love them the pain of a preventable loss of life or brain injury. The online training is provided free of charge. If you wish to obtain CE or CASAC credits (pending accreditation) after completion the module, a nominal

What It Takes To Get Better



■ Stable & Sober Housing

■ Medicine

■ Mental Health Treatment

■ Positive Relationships

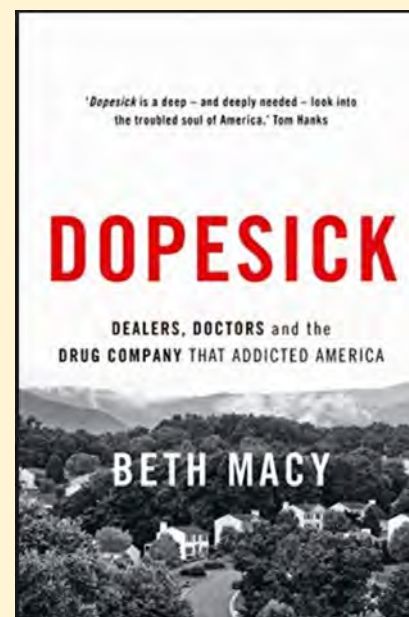
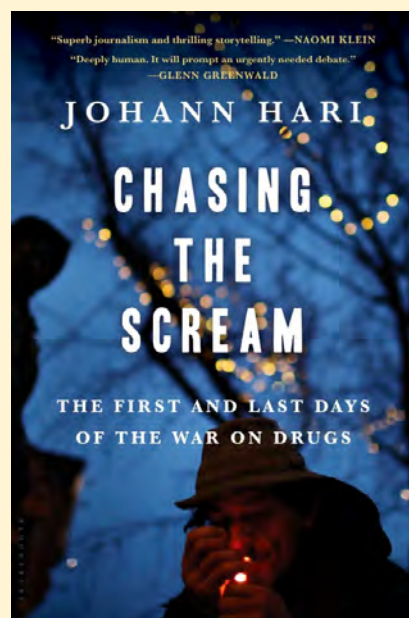
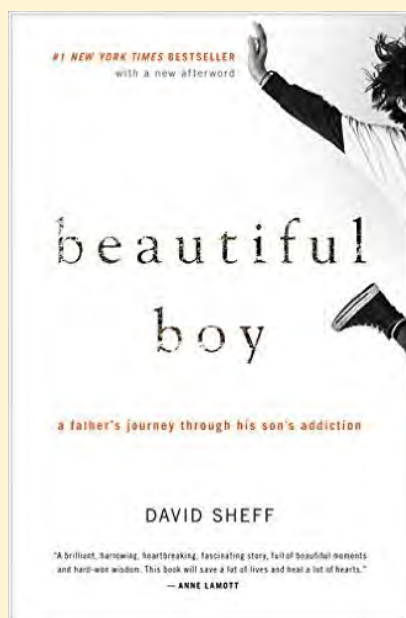
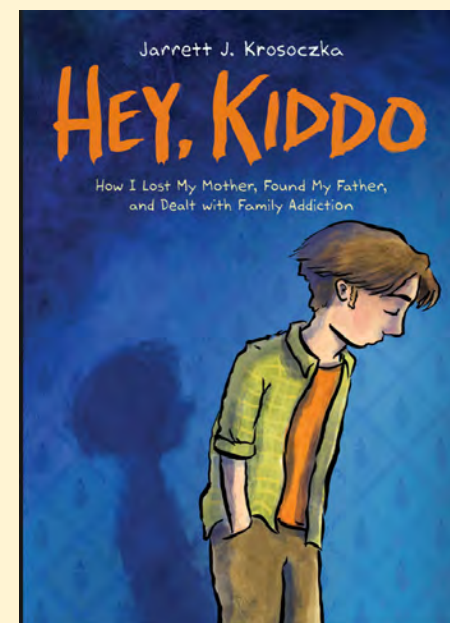
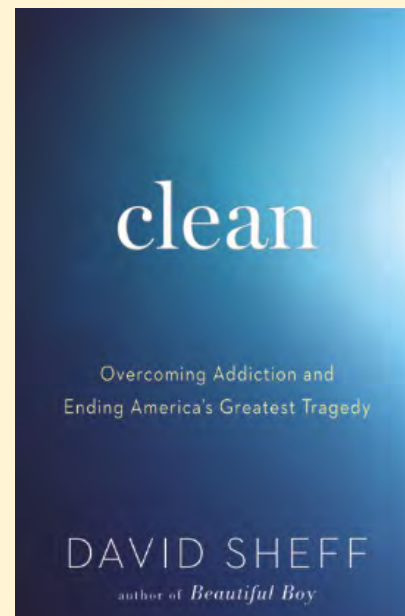
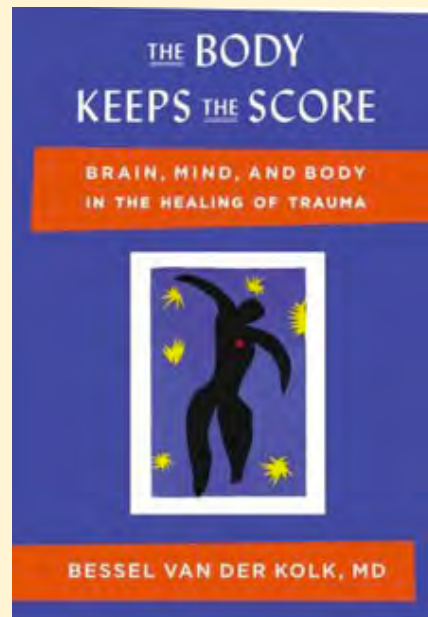
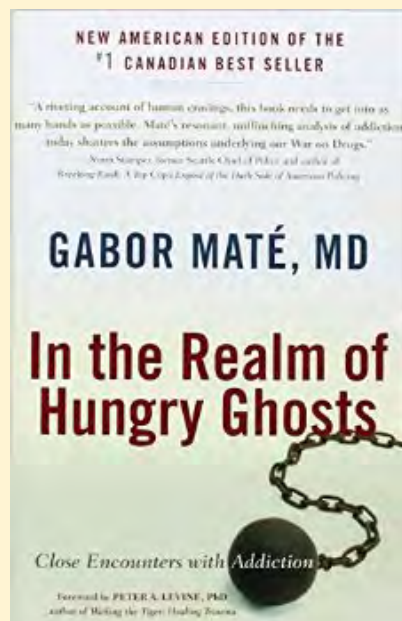
■ Physical Movement

■ Having a Sense of Purpose

What It Takes To Get Better



- | | | |
|-------------------------------|--------------------------------|-----------------------------|
| ■ Stable & Sober Housing | ■ Having a Sense of Purpose | ■ Medicine |
| ■ Mental Health Treatment | ■ Positive Relationships | ■ Physical Movement |
| ■ Working | ■ Parenting | ■ Going to 12 Step Recovery |
| ■ Growing into an Adult Brain | ■ Getting Treatment for Trauma | ■ |
| ■ Hope | ■ Self Love | ■ Feeling Accountable |





Dr. Potee joins the Home Podcast to talk about addiction and stigma

HIPSOBRIETY.COM



Dr. Potee on the impact of the opioid crisis upon children

BOSTON GLOBE; MICHAEL LEVENSON



CNN's Anthony Bourdain discusses addiction with Dr. Potee

CNN; ANTHONY BOURDAIN



Dr. Potee speaks with The Boston Globe about the lack of medication assisted treatment

BOSTON GLOBE; KAREN D. BROWN



Dr. Potee on opioid addiction among high school

